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Handling Malleable Castings in Process

Plant Designed for Saving Labor in Operation Uses Standardized 3-Wheel Trucks—Powdered Fuel Gives Further Economies in Production Cost



BY F. L. PRENTISS

HANDLING and fuel economies are outstanding features in the plant of the Maumee Malleable Castings Co., Toledo, Ohio, which operates a jobbing foundry, making miscellaneous malleable castings in all sizes. The handling methods adopted have resulted in a large decrease in the number of laborers required and consequently in labor costs. Powdered coal is used for firing the melting furnaces and annealing ovens. The powdered coal plant was recently installed and the pneumatic fuel distributing system is claimed to possess marked improvements over similar systems previously placed in operation.

The plant is conveniently arranged for economical production and as far as possible for straight line routing. The melting room is located near the center of the molding floor on one side and the core department and hard iron cleaning department at the end of the foundry. Adjoining the latter on the opposite side is the annealing room and connected to this is the soft iron cleaning room, which also adjoins the shipping room.

All floor transportation is done on standardized 3-wheel trucks hauled by Mercury storage battery tractors, two of which serve the entire plant. The trucks are of steel with slightly hopper shaped tops and have roller bearings. They are all of 3-ton capacity, but the usual truck load is 1½ tons of castings. Three types of trucks are used, all having removable jack tongues, of which the front wheel is a part. When the tongue is removed, an almost instant operation, the front of the truck drops slightly and rests on a projecting foot. The tongues are interchangeable, to fit on all types of trucks.

The general plan is to keep the castings on wheels

from the time they are shaken from the molds until they are ready to ship, except during the time they are going through the manufacturing operations, and there is little deviation from this rule. This eliminates shoveling and much other manual labor in handling. It is stated that the practice followed saves five manual operations between the annealing and shipping departments. An inspection of the plant shows practically no castings piled up on the floor in any part of the foundry.

Another shop practice is to keep castings of one kind separate, as far as practicable, in their movement through the plant in trucks and while being given the tumbling operations. In the case of about 60 per cent of the work, only one kind of casting is loaded on a truck and the work is kept separate to this extent, while going through the various finishing operations and until it reaches the shipping room. This practice saves much labor in sorting castings after tumbling. With the generally adopted plan of handling material in trucks, the use of shop barrels has to a large extent been eliminated.

The melting equipment consists of two 30-ton air furnaces, which are mechanically charged. Pig iron and scrap are received on a dock from a track that runs along one side of the plant, which also serves the shipping department. Each furnace is served by a 3-ton overhead electric traveling crane, which raises the truck over the top of the furnace. The trucks, which have also the function of charging boxes, have lugs at each end to which a sling suspended from the crane is attached. A tripping device is provided for dumping the charge. It takes only 30 minutes to place a 20-ton charge in the furnace, this work requiring only two

men in addition to the crane man and regular furnace men. Other trucks of similar design, but larger, are used for carrying the sprues to the furnaces. These are first rolled in tumbling mills in order to keep the slag and sand out of the furnaces.

The furnaces are operated alternately, one being run 18 to 20 heats and then rebuilt while the other is in operation. The furnaces have two pouring spouts on each side. Iron is tapped into a bull ladle mounted on wheels and handled by one man who, on reaching the foundry floor, empties the metal into hand ladles, from which the molds are poured.

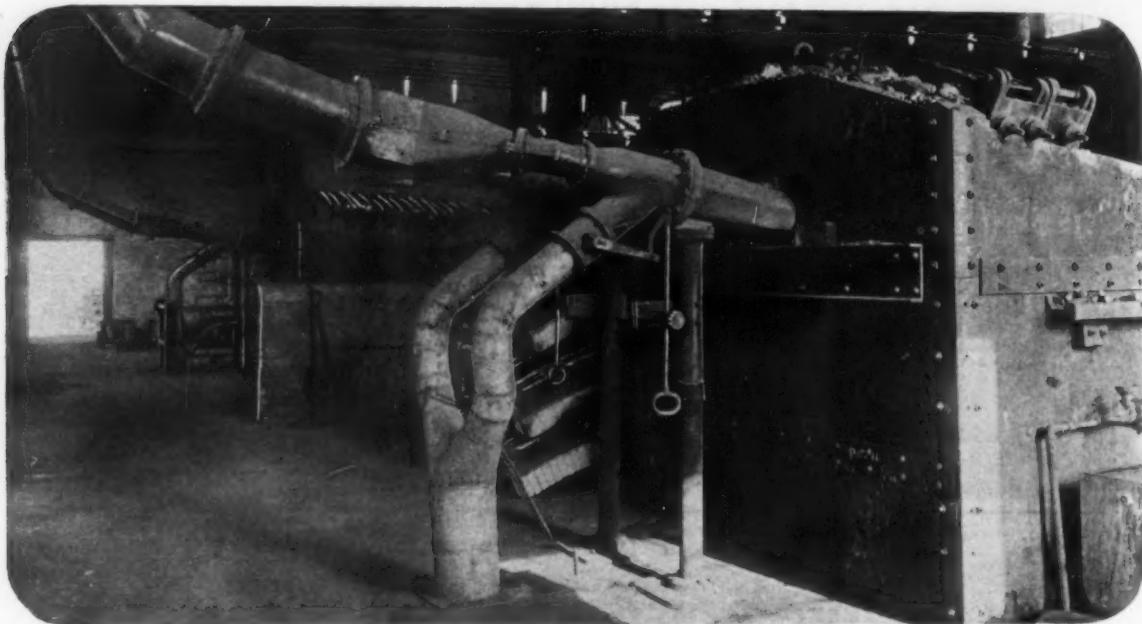
The melting room is divided into three bays. While a few roller molding machines are provided, the squeezer type is more generally used. There are two core rooms, one for men and one for women. Small cores are baked in a four-compartment type of oven, each compartment having five drawers. For large cores there is a double compartment oven. The cores are placed on racks on trucks that run into the oven on tracks. Both ovens are coke fired.

Two cooling ovens are provided for large castings, such as housings or those that have large ribs or open-

barrels and back to sorting tables. A truck of castings coming from the annealing room is picked up by the hoist and dumped in the barrel. As the truck is center-hung by means of lugs at each end, dumping the contents requires little muscular effort.

After the castings are rolled, they are dumped into steel boxes or pans 30 x 56 in. in size, that are also provided with handling lugs at the ends, the hoist being used to place these pans in front of the tumbling barrels. Under each box are twelve small wheels, which permit it to be easily pushed to a position under the tumbling barrel, where it will receive the contents when the barrel is dumped. The hoist picks up the loaded box and deposits it on a long steel rack back of the tumbling mills. Here the castings are sorted and inspected although, as previously indicated, the amount of sorting has been minimized.

Sometimes, when there are not enough castings of a kind to fill the tumbling barrel, a truck is loaded with two kinds of castings, and the material goes through the tumbling mill in this way. However, it is seldom that more than two kinds of castings are handled together through the cleaning operations, except



Powdered Coal for These Melting Furnaces Comes Down Through the 12-In. Distributing Line, Which Branches into Two 6-In. Lines Before Entering the Furnace. At the base of the two nozzles the air supply for combustion is introduced, coming from a main running underneath the floor

ings of large area, and are liable to crack if they are allowed to cool too quickly. These ovens are 8 ft. wide, 10 ft. deep and 5 ft. 6 in. high, and have a capacity of about 5 tons each. Castings, after being shaken from the molds, are placed in these ovens at a dark cherry red heat, with an oven temperature of 1540 deg. Fahr. The ovens are then sealed, the heat is turned off, and the castings remain in the ovens 24 hr. No welding or other repair equipment is used in the plant. With the use of cooling ovens there are few defective castings due to cracks and these are scrapped.

In the annealing department there are eight rooms, six being 14 ft. wide, four being 24 ft. deep, and four 18 ft. deep. The larger hold 42 pots and the smaller 24 pots. An electric charging machine is used for charging the annealing pots into the ovens, and a 5-ton crane operating on a runway in front of the ovens is provided for dumping the pots. The oven temperature is controlled by Brown pyrometers, a thermocouple being connected at the front and back of each oven. In addition to the instruments on the oven, recording pyrometers are located in one of the office rooms.

The method of handling castings through the soft iron cleaning room is of particular interest. This room is equipped with fourteen tumbling barrels of different sizes, arranged back to back in two rows. Overhead handling is done by a 3-ton electric monorail hoist, the track of which runs in front of each row of tumbling

when the castings are the clean-up from the floor or are made to fill very small orders. Time is saved in sorting by not routing castings that are very similar in design through the plant together. For example, right and left brackets for motor car parts are not molded on the same floor, in order to save the time required to sort these, should they get in the same boxes.

Small castings are placed in pans or barrels when sorted, but the larger ones are placed in trucks to go to the soft iron grinding department and shipping room. With the saving of time, due to the handling facilities and quick work of sorting, due to not having more than two kinds of castings in a box, a force of twelve men, six of whom were used for the tumbling barrels and six for sorting, has been reduced to three. These men also take care of a rotary sand blast machine in this department.

The coal pulverizing plant is located in a separate building 32 x 68 ft. and 45 ft. in height to the eaves. Coal is discharged from cars into a track hopper, and a reciprocating feeder delivers it to a primary crusher which reduces it to a maximum diameter of 1 in. From the crusher it passes over a belt conveyor, over which is suspended a stationary magnet which extracts the magnetic material. From the belt the coal passes into a bucket elevator, is discharged into a cross screw conveyor and then into a longitudinal screw conveyor



Annealing Pots Are Placed Within the Ovens, and Withdrawn, by the Floor-Type Electric Charging Machine in the Foreground. The operator, at the right end of the machine, has his control levers conveniently at hand, the single wheel, turned by sprocket and chain, serving to steer the machine

which distributes it into a 120-ton bunker. In addition to bunker storage, provision is made for an over-flow storage in the yard. The overflow passes down a chute with an adjustable spout, so that the point of delivery is close to the coal pile, in order to eliminate fuel dust. Beneath the storage pile is a screw conveyor which carries the overflow back to the bucket elevator.

From the bunker the coal is fed through several adjustable gates onto a belt conveyor driven by a variable speed motor, the speed of the belt being adjusted to supply one or both pulverizers, as desired. From this belt it passes to a screw conveyor which delivers it to a direct type 4 x 30 ft. rotary dryer of 5-ton hourly capacity. A feature of the dryer is that it has a settling chamber beneath the stack into which fine dust settles and from where a screw conveyor carries it to the pulverizer.

There are two pulverizers, each having a pulverizing capacity of $2\frac{1}{2}$ tons per hr., which reduce the coal to such fineness that 95 per cent of it will pass through a 100-mesh screen. A screw conveyor carries the coal from the dryer to the pulverizer feed bins, from which it is fed into the pulverizers by special screw feeders driven by a variable speed motor. Each pulverizer is driven by a 50-hp. constant speed motor.

An over-load relay on the pulverizer motor is cross-connected to the pulverizer feeder motor so that in case of an over-load the feeder is stopped until the pulverizer cleans itself. The pulverizers are of the Fuller type but equipped with a special type of air separator.

Pulverized fuel is drawn from the pulverizers through a 45-in. exhaust fan of cast iron construction, equipped with roller bearings and having a self-contained motor pedestal, so that wearing parts can be replaced without disconnecting the piping or removing the motor. The exhaust fan delivers the fuel to a collector and from this it goes to a 25-ton storage bin, from which it is delivered to both the melting and annealing systems.

Each melting furnace is served by an independent distributing system. Each distributing system is fed by a feed screw, the speed of which is transmitted to a dial at the side of the furnace by an electric indicating tachometer. The screw is driven by a variable speed motor, the starter and controller of which are located at the furnace so that the operator can regulate the feed of fuel to the furnace. As the feed screw is equipped with a revolution counter and calibrated, a close record can be kept of the fuel consumption, which, it is pointed out, is one of the advantages to this



In the Soft Iron Cleaning Room an Electric Hoist Dumps a Truck Load of Castings into a Tumbling Barrel (at Left). After cleaning, the castings are emptied into boxes which the hoist places on the rack at the right, whence they are sorted (when necessary) and sent to stock room or grinding or shipping department

single line system. Similar feed screw equipment is provided for the annealing ovens, there being one screw for the entire battery of ovens.

Coal is taken into the system on the pressure side of the distributing fan by means of a special injector and siphon, this arrangement minimizing the work of the fan blast wheel. The distributing pipe, 12 in. in diameter, divides into two 6-in. pipes near the back of the furnace, each smaller pipe serving one burner. An equal division of the fuel is obtained by an adjustable equalizing device. The auxiliary air required for combustion is introduced at the burner in such a manner as to support the air-coal mixture until complete combustion has taken place. This auxiliary air is supplied from a separate fan room, from which an air duct leads beneath the floor and divides into two 7-in. branches back to the burner. Each air line has a separate control valve.

Coal for the annealing ovens is fed into the suction side of the distributing blower, thus passing through the fan housing, which is of heavy iron construction and equipped with a heavy duty blast wheel running on roller bearings. This fan has the same features as the 45-in. exhaust fan that draws the fuel from the pulverizers. There is an over-load relay between the motor driving the distributing blower and the variable speed motor driving the feed screw, so that if, through carelessness or inexperience on the part of the operator, an over-supply of coal is fed into the system, an over-load is produced on the motor driving the distributing blower, which automatically stops the feed screw motor. A 12-in. distributing pipe carries the coal to the ovens, this being reduced in size in proportion to the amount of coal consumed by the oven. The fuel supply pipes are 3 in. in diameter, dropping from the header to the burner. From the last oven a 6-in. return pipe carries the unused coal and air back to the suction side of the distributing blower.

The main air supply to the system is taken in through a 12-in. safety vent with intake just below the roof. The air is drawn through a vertical vent stack and passes through an indicator which is calibrated to indicate in cu. ft. per min. the flow of air into the system. The movement of the air-indicating float is transmitted electrically to a dial at the ovens, alongside which is an indicating tachometer dial similar to the one showing the feed screw speed in the fuel system for the melting furnace. The starter and control for the feed screw motor is also located on the same instrument board and, by means of a chart, the operator determines the proper feed screw speed for a predetermined air-coal mixture. As in the case of the melting furnaces, the secondary air is admitted back of the burner. The secondary air fan sets on a steel support back of the ovens. The air header pipe from the fan branches both ways from near the center of the row of ovens.

The advantage of the arrangement of the fuel distributing system for the annealing ovens, it is pointed out, is that the fuel consumption can be determined accurately, as the coal is fed into the system at the

same rate at which it is burned. The return collector feature is thus eliminated and the arrangement is said to tend toward economy of fuel cost and to insure greater safety. The length of the line through which fuel is conveyed to the ovens is 600 ft. Coal is delivered to the melting furnace at 6 oz. pressure at the blower and to the annealing ovens at 10 oz. pressure at the fan. The mixture of air and pulverized coal in the distributing main is 1 lb. of coal to 60 cu. ft. of air, and the mixture of air and coal when burning in the ovens is 1 lb. of coal to 200 cu. ft. of air.

With the use of powdered coal, very little smoke comes from the stacks of either the melting or annealing furnaces, which is an important factor in industrial centers, where the atmosphere is more or less smoke laden because of the discharge from factory furnaces.

In operation, with the use of powdered coal for melting, the first heat in the morning requires about five hours and the second heat in the afternoon four hours. One ton of coal is consumed in

melting three tons of iron. No definite data are available in regard to the amount of coal consumed in the annealing ovens. About 40 tons of castings are placed in the large ovens and these are brought up to a temperature of 1580 deg. Fahr. in 30 hr.

The coal pulverizing and distributing system, known as the New Method Fuel System, was designed and built by the Holbeck Engineering Co., Marshall Building, Cleveland.

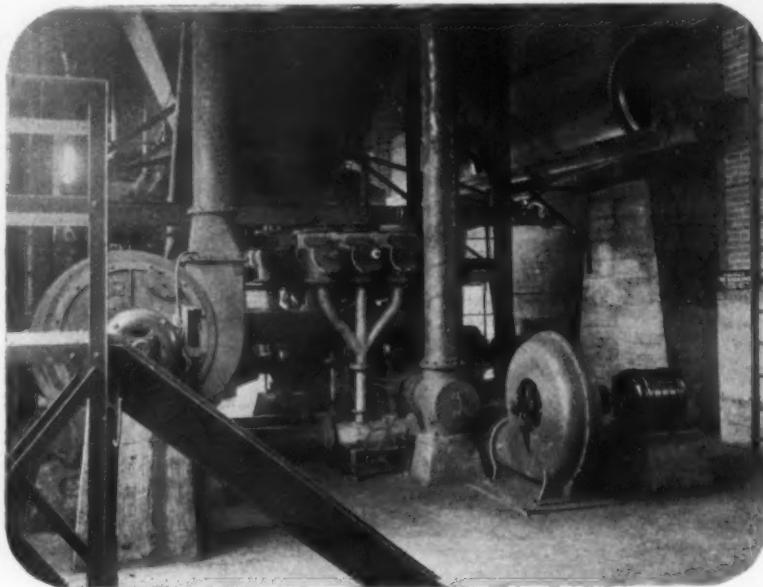
Stainless Steel Rule

A pocket size rule of stainless steel has been added to the line of the Brown & Sharpe Mfg. Co., Providence. The obvious advantage of the rule is that it will retain its bright finish, eliminating the difficulty usually experienced in reading graduations on rules which have been rusty or blackened from use. The new rule, designated the No. 350, is available in the 6 in. size only, graduated in eighths, sixteenths and sixty-fourths of an inch.

Automobile Production Increases

For the tenth consecutive month the production of automobiles in the United States has exceeded 200,000. The figure for January is given by the Department of Commerce as 221,697 passenger cars and 19,206 trucks, compared with 206,372 passenger cars and 20,035 trucks for December. The January figure is the largest since August, when the totals were 248,118 passenger cars and 24,420 trucks.

Westinghouse Electric & Mfg. Co., in the past few months, has received orders for steam turbine-generators aggregating nearly 600,000 kw. Included in these orders is the largest machine ever built by the company, 62,500-kva. generator, for the Brooklyn Edison Co., and the machine with the highest steam pressure, 500 lb., 50,000 kw., for the Commonwealth Edison Co.



In the Coal Pulverizing Room, at the Right Is the Blower for the Melting System, Feed Screws, Special Siphon and Injector. The blower at left is for the annealing furnaces. Overhead at right is the drier, with the dust removing screw conveyors alongside. In the upper background appears the pulverized coal storage bin

Dark Outlook for Merchant Marine

Withdrawal of Vessels from Unprofitable Routes Will Probably Result from Defeat of the Subsidy Bill in the Senate

BY L. W. MOFFETT

WASHINGTON, Feb. 27.—Thanks to minority rule, which occasionally insists on asserting itself in the American republic, the ship subsidy bill is dead. It was killed by a filibuster, conducted chiefly by Senators who pretend to espouse the cause of "democracy," organized labor and the farm bloc. Because the measure assuredly was designed to serve these as well as all other interests of the country, the manner in which it came to death was of a decidedly ironical character. An exquisite touch is given to the whole proceeding when it is recalled that the ship subsidy bill was the outstanding measure which the Administration had intended to have enacted at the present session of Congress. Frankness compels the statement that the bill was given only lukewarm support in the Senate by some of the supposed Administration supporters, although Senator Jones, chairman of the Committee on Commerce, who had charge of the measure, made a determined effort to save it and to push it through at the present session of Congress. He was defeated, however, by reason of the lukewarm support given the bill together with the filibuster. Like all filibusters, the one directed against the ship subsidy bill was farcical in character and some of the tactics employed by those engaged in the performance were on a par with the tactics of a circus clown. Had it not been for the great importance of the bill, the methods employed to defeat it would have afforded amusement mingled with disregard for the caliber of statesmanship shown by some of those who stood ready to resort to any plan to defeat the measure. Unquestionably the measure was opposed by some who were entirely sincere and who adopted an altogether becoming attitude, an example of which was Senator Underwood of Alabama. The Alabama Senator, while opposed to the bill, made protest against the filibuster and urged, as had President Harding himself, that the measure be allowed to come to a vote.

Sentiment for Merchant Marine

Its defeat probably means that hope for constructive shipping legislation has disappeared and may not return for many years. If such legislation should be revised it would be due to insistence on the part of the country that is vigorous in demanding the creation of a privately owned American merchant marine. Sentiment to this effect already exists to a perhaps greater degree than is generally known, though it must be conceded that until lately it has not been expressed in forceful terms, while the opposition to the subsidy bill has been extremely clamorous and noisy, even though it has been characterized by a marked absence of logic. No doubt there are Senators who favor a privately owned American merchant marine, but are opposed to its creation through a subsidy. At least a number of them profess to take this attitude. This has given rise to the hope that even if the Administration is unable again to revive subsidy legislation, some sort of compromise plan may be developed to bring it about. One of the favorite proposals in this connection is that legislation be passed permitting preferential import duties on goods carried in American bottoms. No doubt this would develop the usual cry of the propagandists of retaliation, dangerous international complications, and other straw men that always are erected to defeat an American merchant marine, but the cry is one that apparently is exhausting itself and probably would not carry the desired effect. It is said that a number of Democratic Senators would join the Administration in such a plan, though this is by no means to indicate that the Administration is in favor of it or that it would meet with the approval of the State Department.

The historical fact remains, however, that the American merchant marine developed its dominant position before the Civil War through the application of preferential import duties on goods carried in American vessels. Apparently there is no immediate purpose of the Administration, if any is in contemplation at all, to put into effect those sections of the Jones shipping act providing preferential and joint rail and water rates to assist the American merchant marine. Naturally the question arises as to what will become of the American merchant marine, which foreign interests, joined by a number of domestic interests, are insisting should be scrapped, their use so far as these interests are concerned, no longer serving them any purpose. This is the case now that their mission as part of a war fleet, built up at a cost of \$3,000,000,000, has been performed. This attitude taken against the American ships, while calloused, is purely a business proposition, and will have to be dealt with as such.

The President's Position

President Harding is represented as feeling that the country can determine for itself the responsibility for defeat of the ship subsidy bill. At the same time, the Administration apparently is not clear as to what may be done with the ships. However, it seems to be fairly well determined that the already large number of idle ships will be increased. It has been pointed out by Shipping Board officials that some routes are proving extremely costly. It is stated from an authoritative source that losses ranging from \$40,000 to \$100,000 are sustained by the Government on some of the round trips made from American ports. Interestingly enough, the highest costs of operation are from ports in the South where the most vigorous opposition to the ship subsidy bill came. The logical thing to do, it appears, would be to abandon these high cost routes, which would mean that the Southern ports would suffer most, not by way of reprisal on the Administration in any way, but merely as a matter of necessary economy, the subject which shared so largely in arguments of opponents to the bill.

Unless some measure is adopted in the near future, the outlook for the American merchant marine, therefore, and for a necessary auxiliary to the Navy, plainly is discouraging. It will mean that farm products and manufactured goods from and to the United States will have to be carried in foreign vessels, a return to "normalcy" that the Administration fervently had been hoping had disappeared forever. This, of course, will mean a recurrence of discriminations against American exports and imports, a disregard of American business, when shipping tonnage is needed for nationals, whose flags the foreign ships fly, as well as the payment of the enormous freight costs to other countries.

Importance of Legislation

It has been obviously true that a great amount of education remains to be done for the benefit of the American public mind before it is acquainted with the importance of constructive shipping legislation. It also is quite true that for the past two years there have been insistent complaints that the world is over-tonnaged, that there are too many ships and that the United States has been told that ships built by it during the war should be considered as war material and scrapped in order that this great surplus of tonnage might be removed and the ocean business brought to a normal basis.

In this connection Commissioner Edward C. Plum-

mer of the Shipping Board made some interesting comments. He stated that the demand for removal of the ocean surplus tonnage has, perhaps, naturally been advocated by foreign shipping interests, while at the same time they have been increasing their fleet. Mr. Plummer says this raises the question as to why, if the surplus tonnage is such a burden, they are increasing it, while demanding retrenchment and inaction on the part of the United States. Answering his own question, Mr. Plummer said that, of course, the purpose is that, while American ships and yards are kept in idleness, competitors may be allowed to supply themselves with a fleet of the newest and most economical ships, so that when the time does come that Government aid has made possible the overcoming by American ships of the many handicaps, commercial and legislative, now burdening American vessels, these competitors may be so far in advance in type and in quantity of economical ships that they may be able to maintain a stiff conflict against the United States ships which may attempt the trade routes which these competitors have secured for themselves.

How Farmers Have Benefited

"Today, and for the past year, the farmers of this country have been enjoying lower freight rates on their exports than ever were known before," said Mr. Plummer. "Instead of the increase which has come to all

other forms of transportation, there has been a decrease in the cost of ocean transportation so far as the farmer is concerned. And that saving of millions to the American farmer has been brought about solely by the presence of American ships. That is admitted even by the opponents of American shipping legislation. That fact is another conclusive proof of the necessity of American ships in the interests of American trade.

"Now, when it is recalled that the exports of manufactured goods from this country are constantly increasing; that we must secure foreign markets or else our mills must soon face an over-production with unemployment following; when we review the facts that no nation ever has built up adequate foreign markets except through their own national ships, the importance of American ships to our whole people becomes very clear.

"The claim that American ships do not necessarily mean lower freight rates is absolutely disposed of by history and by the records even now being made in our coast-to-coast trade. That trade is limited to American vessels. That trade is being handled by privately owned American ships, and yet the freight rates are so low that the Shipping Board has been approached with a request for interference to the end that higher rates might be established in order that the railroads might not be deprived of so much cargo."

BY-PRODUCT COKE

Large Production for January—Commission Investigating Transportation

WASHINGTON, Feb. 27.—Production of by-product coke in January totaled 3,100,000 net tons as against 3,063,000 tons in December, according to the Geological Survey. As the present capacity of by-product ovens is 3,725,000 net tons per month of 31 days, the output in January represented 83.2 per cent of capacity. In January, 1922, production was but 51.9 per cent of capacity. Of the 71 plants in existence, 62 were in operation and nine were idle.

Production of beehive coke continued to increase in January, the total output being 1,478,000 net tons, an increase over December of 12 per cent. In comparison with the corresponding months of 1922 and 1921, increases of 198 per cent and 30 per cent respectively, are indicated.

A new record of production of fuel briquets was established in 1922. Reports to the Geological Survey show that the total output was 619,425 net tons against 398,949 tons in 1921. In comparison with 1920, the year in which the previous maximum was attained, the increase was slightly over 9 per cent.

Production of bituminous coal, according to estimates, totaled 10,836,000 net tons for the week ended Feb. 10. The bituminous situation no longer is a question of immediate concern as it relates to production, but the Federal Fact Finding Commission is making an intensive study looking to stabilization of the coal problem. It is now taking up the matter of transportation, according to Chairman John Hays Hammond. Particular inquiry is being made into the matter of even distribution of coal and during the next two weeks the commission will go through the records of the Interstate Commerce Commission to ascertain knowledge of coal delivering facilities of the railroads. It is likely that the Fact Finding Commission will make its second report about July 1, and will conclude its work by Sept. 22 or sooner. Chairman Hammond is of the opinion that in addition to limiting the number of coal mines, operating only the most efficient ones and reducing the number of coal miners, the question of transportation and adequate storage facilities for coal requires immediate attention.

Considerable criticism is made of the policy of railroads in taking advantage of the power to commandeer coal where there is an apparent shortage which some-

times is not so pressing as to warrant this action. The commission also is said to be planning to urge the iron and steel and other large consuming interests to establish a more uniform plan of purchasing supplies and of increasing storage facilities.

Along with the study being given by the Coal Commission to the transportation situation, the Department of Justice has taken steps to compel a number of railroads to immediately place their equipment in safe condition. It has been indicated that this may result in sizable orders for iron and steel.

President Daniel Willard of the Baltimore & Ohio Railroad is said to have discussed the matter with President Harding last Saturday. The railroad interests are watching the move of the Department of Justice with some apprehension, it is said, feeling that the action intended is too drastic and in the event it is determined this is the case, it is likely that the railroads will make protest, legal or otherwise.

McWane Cast Iron Pipe Co.'s New Plant in Operation

BIRMINGHAM, ALA., Feb. 26.—Less than six months ago ground was first broken for the new pressure pipe plant of the McWane Cast Iron Pipe Co. in East Birmingham. On March 1, exactly on schedule, the company will be making pipe there. This is the announcement made Saturday by J. R. McWane, president of the company.

The new pipe plant is on a portion of a 30-acre tract along the main line of the Louisville & Nashville Railroad. The first unit consists of a main foundry 108 by 340 ft., which will later be extended to a length of 540 ft., and additional units of this final size built from time to time as the business of the company grows.

Serving the foundry are the necessary machine, pattern, finishing, and joint-making shops, cupola house of concrete and steel, office building and company cafeteria.

Koppers coke ovens of the improved type, arranged in two batteries of 57 ovens each, together with by-product and benzol plants, coal and coke handling equipment, etc., are to be built at the Lackawanna plant at Buffalo of the Bethlehem Steel Co. Construction will be started at once and it is expected that the plant will be completed within a year or 15 months.

Some Economics of Machine Tool Making

Comparison of Characteristics of This Industry with General Manufacturing—Influence of Size of Establishment on Profits

BY ERNEST F. DU BRUL*

FEW people give thought to the vital economic fact that without the organizing, imaginative minds of business leaders there would have been little material progress in the world. Those who propose untried industrial systems for Dreamlands never think of it at all. Without free play for the adventurous, creative, pioneering spirit of those who can organize and direct industry the world would soon slip back

some men must look forward many years to a demand from unborn generations.

A planer built perhaps ten years ago, was used to plane a bed for a lathe shipped today. Ten years from now that lathe may be turning parts for a new locomotive. Ten years later that locomotive will haul ore, which in turn will be smelted into pig iron. Some of that iron will be cast into stoves, one of which will be

Table I.—Census of Manufactures, 1919, Reduced to "Per Shop" and "Per Wage Earner" Bases

	All Industries		Machine Tools		
	Totals	Per Shop	Per Wage Earner	Per Shop	Per Wage Earner
Establishments	290,105	.....	.....	403	.....
Wage earners	9,096,372	31	.....	53,111	132
Salesmen, clerks, etc.	1,033,507	4	.....	6,186	15
Management	682,857	2	.....	2,465	6
Total persons.....	10,812,736	37	.....	61,762	153
Capital employed	\$44,559	\$153,594	\$4,898	\$231.0	\$573,298
Value of product.....	62,418	215,156	6,862	212.4	527,047
Turnover of capital.....	140%	.....	.....	92%	.....
Materials used	35,730	123,163	3,927	56.0	139,077
Fuel and power rented.....	1,646	5,674	181	3.0	7,409
A.—Value added†.....	25,042	86,319	2,754	153.4	380,561
Wages paid	10,534	36,308	1,158	66.2	164,215
Salaries paid	2,892	9,971	318	18.0	44,759
Contract work	465	1,501	51	1.5	3,648
Rents paid	212	731	23	0.5	1,182
Taxes—Federal	1,790	6,170	197	15.7	39,096
Taxes—State	289	997	32	2.1	5,169
B.—Deductions.....	\$16,182	\$55,778	\$1,779	\$104.0	\$258,069
Residue (A-B).....	\$8,860	\$30,541	\$975	\$49.4	\$122,492
7% on capital.....	3,119	10,752	343	16.2	40,130
Net residue	5,741	19,789	632	33.2	82,362
Per cent of product.....	9.2	.....	.....	15.6	625

*Dollar items in these two columns are expressed in millions.

†Value of product less cost of materials; it represents the manufacturing effort and is a measure of the result.

from its achievement of the comforts and luxuries that it enjoys. Only the joint effort of business brains and mechanical brains keeps us as we are, and pushes us on.

Nature is not over-generous in her reward for mere muscle effort. For many centuries, even the most progressive nations had to apply most of their muscle power to producing food, shelter and clothing, and so did not get much time to produce comforts or luxuries. About 1760 began the series of great industrial inventions that changed hand industry into machine industry. While these inventions increased the supply of manufactured goods, food production continued to require a lot of muscle power for another 80 years, until McCormick's inventions transferred to mechanical appliances the muscle power and the skill of many agricultural laborers. As one man thereafter could raise food for many besides himself and his family, surplus labor was released from farming, and manufacturing began to grow rapidly. Increasing efficiency of farm machinery will continue to release more men from the necessity of raising food, and allow them to earn a better living working in factories.

Consider how little of man's work continues in existence for 100 years. Most of it is replaced before worn out, by better and more adaptable plant. Even if we made no advances in methods we would have to keep on replacing the old, as the forces of nature soon destroy the handiwork of man. All this requires that

sold to a young housewife not yet born. Only because some men looked far ahead to such demands of our present generation have we the comforts we enjoy. Only because some men could save capital, and do so in reasonable security, are present productive processes giving us these comforts. Only as this generation saves something out of consumption and puts the savings to work can future generations have greater comfort.

An impression of the rapid growth in productivity is had from comparison of the value of manufactures, which in 1812 was \$170,000,000 for the United States, [\$22 per head of the 7,700,000 population] whereas in 1919 it was over \$62,000,000,000 [\$595 per head of the 105,000,000 population]. Of this total, 1½ per cent, or nearly \$1,000,000,000, was industrial or shop machinery alone, to say nothing of electrical equipment, automotive or other vehicles, tractors, agricultural machinery, railroad cars and locomotives. Of the industrial machinery, machine tools form the largest single class, about twice the value of the next largest class, textile machinery.

Machine Tools the Master Tools

Because the blacksmith made the tools for all the other workers who built the temple of Solomon, the legend is that King Solomon honored the blacksmith above all the other workers. The modern machine tool builder now stands in that blacksmith's place, producing the master tools for all other crafts.

In our analysis of the statistics of the census of

*General manager National Machine Tool Builders' Association, Cincinnati. Paper read before the American Society of Mechanical Engineers at Philadelphia, Feb. 27.

manufactures of 1919, we are not to believe that the statistics are absolutely accurate, but it is fair to assume that the percentage of error is no greater in one case than in the other. First, let us see how the shops that make the master tools compare in relative size with all the factories that make all the goods the country produces. To get our first comparison we reduce this data to a "per shop" basis, and also to a "per wage earner" basis as set forth in Table I.

From the "per shop" figures we see that the average machine tool shop is about four times as large as the average of all industries, as shown by the items of capital, number of wage earners, added value, wages, salaries, etc. As to material used, however, there is not so much spread, because the machine tool builder

After taking out of the total value all the amounts specified, there still remains a balance. This is designated as "residue," for want of a better term. As the census figures do not go into further detail we can only say that this residue still includes costs like depreciation, obsolescence, insurance, advertising, repairs, interest, legal, patent, auditing, traveling, and all other expenses, not covered by the specific expenses given above. It would be proper to deduct from this an allowance for interest on capital, which in 1919 at the going rate was easily 7 per cent. This would leave the average shop a net residue of \$19,789, and the machine tool shop \$82,362. From the "per wage earner" figures we note that the machine tool builder used 548 less capital than the average.

Table II—Distribution of Census Figures on Basis of (a) Value Added by Manufacture as 100 Per Cent and (b) Value of Products as 100 Per Cent

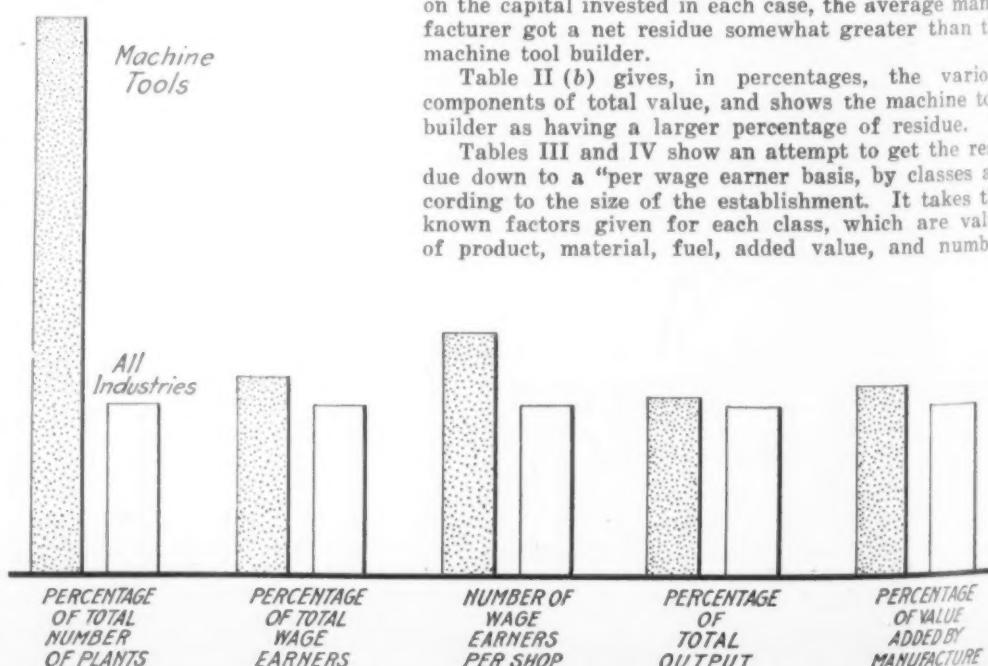
	All Industries			Machine Tools		
	Amount	(a)	(b)	Amount	(a)	(b)
Capital employed.....	\$44,558,593,771	177.9	71.4	\$231,039,843	150.7	108.8
Value of product.....	62,418,078,773	249.2	100.0	212,400,158	138.5	100.0
Materials used.....	35,730,393,727	142.7	57.2	56,048,334	36.5	26.4
Fuel and power rented.....	1,645,986,556	6.6	2.6	2,985,974	1.9	1.4
Value added.....	25,041,698,490	100.0	40.1	153,365,850	100.0	72.2
Wages paid.....	10,533,400,340	42.1	16.9	66,178,969	43.1	31.2
Salaries paid.....	2,892,371,494	11.6	4.6	18,037,856	11.7	8.5
Contract work.....	464,403,700	1.9	0.7	1,469,844	1.0	0.7
Rents paid.....	212,043,059	0.8	0.3	476,353	0.3	0.2
Taxes—Federal.....	1,790,197,060	7.1	2.9	15,755,796	10.3	7.4
Taxes—State.....	289,172,297	1.2	0.5	2,083,106	1.4	1.0
Residue.....	8,860,110,510	35.3	14.2	49,363,926	32.2	23.2
7% on capital.....	3,119,101,563	12.4	5.0	16,172,789	10.6	7.6
Net residue.....	5,741,008,947	22.9	9.2	33,191,137	21.6	15.6

takes relatively crude material, and with skilled labor and inventive brains transforms it into a product of high utility. The size of his shop shows the machine tool man to be a good manager, and some other things confirm this. He paid his men better than the average employee got elsewhere.

The Measure of Manufacturing Effort

The item of added value is the index of manufacturing activity. This item excludes material from the total value. The manufacturer's function is to convert raw material into finished product. The machine tool builder added more value per wage earner than did the average manufacturer. As to Federal taxes, the machine tool builder paid more than his share, whether figured on the per shop basis or on the per wage earner basis, or as a percentage of what was left after deducting material and wages.

Relative Showing of Shops With Individual Output of \$500,000 or More. Of all the machine tool shops, 23.1 per cent belong in this class, against only 6.8 per cent for "All industries." About 80.5 per cent of the machine tool wage earners, 81.9 per cent of their total output and 83.1 per cent of their added value fall in this group of large shops, compared with 69.2 per cent, 78.1 per cent and 73.8 per cent for the general shop. Machine tool shops in this class average 460 wage earners, to 320 for all industries. The machine tool shops are shown stippled



The average manufacturer took \$4,108 worth of material and fuel per wage earner in 1919, and by processing added to it \$2,753 worth of utility, or 67 per cent. But the creative machine tool builder took \$1,111 of material per wage earner, and added \$2,887, or 260 per cent of utility to it.

As the real function of all manufactures is to add utility, it would seem fair to compare them by using, as a base, the value added. Table II (a) reduces the various factors to a percentage of this base. From this we deduce that to produce \$100 of added value at the market price of his goods, the average manufacturer employed \$178 of capital against the machine tool builder's \$151. The average manufacturer used \$149 of material against the machine tool builder's \$38. It cost them both about the same in expenses specified, except that Federal taxes took \$3 more out of the machine tool builder. If now we allow 7 per cent interest on the capital invested in each case, the average manufacturer got a net residue somewhat greater than the machine tool builder.

Table II (b) gives, in percentages, the various components of total value, and shows the machine tool builder as having a larger percentage of residue.

Tables III and IV show an attempt to get the residue down to a "per wage earner basis, by classes according to the size of the establishment. It takes the known factors given for each class, which are value of product, material, fuel, added value, and number

Table III—All Industries, Classified According to Size of Shop (Value of Output)

	All Shops	\$20,000 and under	\$20,000 to \$100,000	\$100,000 to \$500,000	\$500,000 to \$1,000,000	Over \$1,000,000	All of \$100,000 or More	%
Establishments	290,105	152,925	52.7	77,911	26.8	39,648	13.7	9,208
Wage earners.....	9,096,372	293,535	3.2	793,528	8.7	1,720,161	18.9	1,114,615
Per shop.....	31	2	...	10	...	43	...	121
Capital*†	\$44,559	802	1.8	2,540	5.7	6,417	14.4	4,634
Per shop.....	153,594	5,244	...	32,599	...	161,835	...	503,268
Per wage earner.....	4,893	2,713	...	3,200	...	2,730	...	4,157
Value of products*	62,418	1,113	1.8	3,571	5.7	8,976	14.4	6,467
Per shop.....	215,156	7,276	...	45,838	...	226,394	...	702,338
Per wage earner.....	6,862	3,764	...	4,500	...	5,218	...	5,802
Materials and power*	37,376	467	1.2	1,823	4.9	4,823	12.9	3,584
Per shop.....	128,837	3,049	...	23,405	...	121,648	...	389,282
Per wage earner.....	4,108	1,577	...	2,298	...	2,803	...	3,215
Value added by manu- facture*	25,042	646	2.6	1,748	7.0	4,153	16.6	2,883
Per shop.....	86,319	4,228	...	22,432	...	104,746	...	313,056
Per wage earner.....	2,753	2,187	...	2,202	...	2,414	...	2,586
Wages paid*‡	10,534	337	3.2	916	8.7	1,991	18.9	1,296
Per shop.....	36,308	2,204	...	11,762	...	50,212	...	140,704
Remainder*§	14,508	309	2.1	832	5.7	2,162	14.9	1,587
Deductions* **	5,648	119	...	322	...	842	...	621
Per shop.....	19,470	775	...	4,132	...	21,226	...	67,474
Per wage earner.....	621	402	...	405	...	489	...	557
Residue*	8,860	190	...	510	...	1,320	...	966
% interest on capital*	3,119	56	...	178	...	449	...	324
Net residue*	5,741	134	2.3	332	5.8	871	15.2	642
Per shop.....	19,789	879	...	4,255	...	21,979	...	69,648
Per wage earner.....	631	455	...	418	...	506	...	515

*Expressed in millions of dollars.

†Distributed among the groups in proportion to value of product.

‡Distributed among the groups in proportion to number of wage earners; average per man, \$1,158.

§Value added by manufacture, less wages paid.

**Salaries, contract work, rents, federal and state taxes; distributed in proportion to "remainder," just above.

of wage earners. We assume that the average wage "per wage earner" is the same in all classes, though it probably would be higher in the small shops. Deducting wages from added value shows a still greater concentration of the "remainder" in the large shops. We next distribute the salaries, taxes, etc., in proportion to this last balance.

This is overloading the small shop with Federal taxes that it may not have paid, as its earnings were smaller per man, and it had an exemption of \$2,000. On the other hand, there is some counterbalance to this overload, because the overhead per wage earner is larger in the small shops than in the large ones. This is true in spite of the notions of many proprietors of small shops, and officers of small corporations, who do not pay themselves the salaries they could earn elsewhere, and thereby deceive themselves into thinking their overhead is low. On the whole, the method here used probably gives them a better showing than the facts are, in wages, in expense items, and in residue per wage earner.

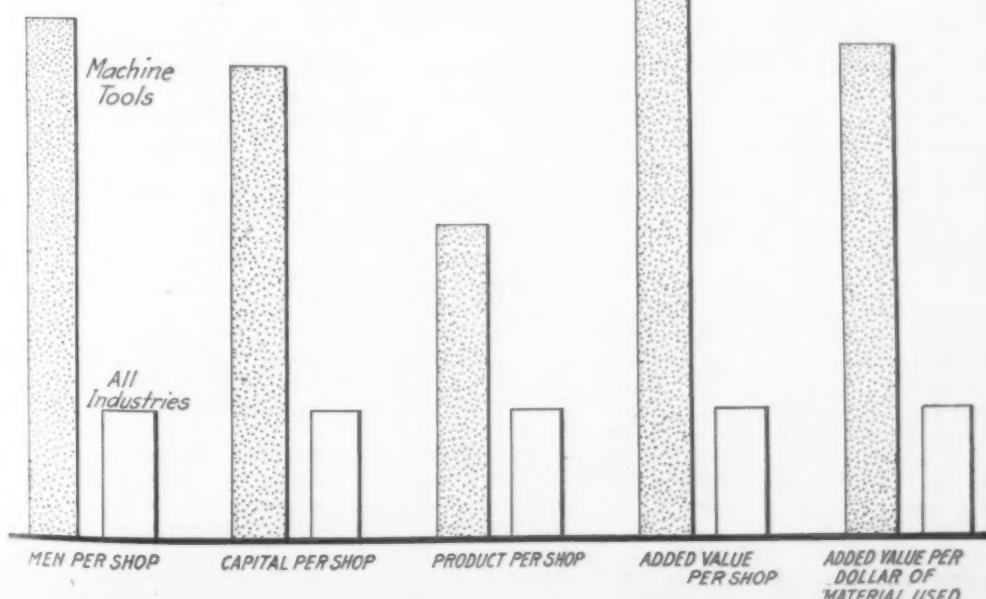
From these figures some interesting suggestions arise as to machine tool builders. Note the small residue per wage earner left in shops below the \$100,000 line, which is not enough to pay interest, to say nothing of allowing for other expenses and profit. The men who have these small shops seem to be taking a

very long chance that they can ill afford to take. Yet 44 per cent of the machine tool builders were doing that very thing. In the same classes, in "All Industries" there was a bigger percentage of small shops, but they apparently had a bigger residue per wage earner, indicating a better chance to succeed, on a small scale, in shops other than machine tool shops.

It is worth noting that, although machine tool shops must employ a highly skilled force of wage earners, and their force is larger in each class than the average, still in each class the residue per wage earner was less in machine tools than the average, though this residue increases with the size of the shop, as we would expect.

Concentration in Large Plants

Tables III and IV throw some interesting light on the concentration of industry in large establishments. The net residue percentage for each class, compared to the percentage of number of establishments, would indicate that while a larger proportion of machine tool shops are in the million dollar class, and while the proportion of net residue is also higher in this class of machine tool shops than for all industries, the relative concentration is over three times greater in all industries than in the machine tool industry, for 3.6 per cent of the shops in all industries (\$1,000,000 class)



How the Average Machine Tool Shop Stands "Head and Shoulders" Above the Average of other Manufacturing Establishments Is Shown Clearly in this Diagram. There are more than four times as many men per shop, more than four times as much value added per shop by the work of these men, nearly four times as much capital and about two and one-half times as much output per shop. And the value added to each dollars worth of material, in the machine tool shop (\$2.60), is nearly four times the average (67c.) The machine tool shops are shown stippled

produced nearly the same percentage of the total value of output as was produced by 12.9 per cent of the machine tool shops in the same (largest) class.

Table III shows that, while small shops are numerous, the greatest bulk of production is effected in shops turning out \$1,000,000 worth of product or more. While the shops turning out less than \$100,000 per year are nearly 80 per cent of the general total, they employ only 12 per cent of the wage earners, to say nothing of the mass of proprietors, etc., not listed as wage earners. Then they succeed in producing less than 10

which they prefer to an average business with about 500 average wage earners monotonously plodding along making the same thing every day, whether it be shirts or automobiles. The high level of management in the machine tool business is indicated by the fact that 15 per cent of the machine tool builders are in the \$2,000,000 group of value adders whereas only 3.6 per cent of the average manufacturers are in the \$1,500,000 class. Moreover, 10 per cent of the machine tool men are in the \$500,000 class of value added, compared to 3 per cent of average manufacturers in the \$300,000

Table IV—Machine Tool Builders, Classified According to Size of Shop (Value of Output)

	All Shops	\$20,000 and under		\$20,000 to \$100,000		\$100,000 to \$500,000		\$500,000 to \$1,000,000		Over \$1,000,000		All of \$100,000 or More	
		%	%	%	%	%	%	%	%	%	%	%	%
Establishments	403	66	16.4	110	27.3	134	33.2	41	10.2	52	12.9	227	56.8
Wage earners	53,111	245	0.5	1,941	3.6	8,162	15.4	7,235	13.6	35,528	66.9	50,925	95.9
Per shop	132	4	...	18	...	61	...	176	...	683	...	224	...
Capital [†]	\$231,039	\$693	0.3	\$6,469	2.8	\$34,656	15.0	\$30,266	13.1	\$158,955	68.8	\$223,877	96.9
Per shop	573,298	10,502	...	58,811	...	258,634	...	738,195	...	3,056,834	...	986,245	...
Per wage earner	4,350	2,829	...	3,332	...	4,246	...	4,183	...	4,474	...	4,396	...
Value of products [‡]	212,400	615	0.3	6,027	2.8	31,760	15.0	27,856	13.1	146,142	68.8	205,758	96.9
Per shop	527,047	9,324	...	54,786	...	237,015	...	679,415	...	2,810,427	...	906,424	...
Per wage earner	3,999	2,511	...	3,105	...	3,891	...	3,850	...	4,113	...	4,041	...
Materials and power [§]	59,034	231	0.4	2,050	3.5	10,271	17.4	7,846	13.2	38,636	65.5	56,753	96.1
Per shop	146,486	3,497	...	18,632	...	76,651	...	191,380	...	743,001	...	250,013	...
Per wage earner	1,111	942	...	1,056	...	1,258	...	1,085	...	1,087	...	1,115	...
Value added by manu-													
facture [¶]	153,366	385	0.3	3,977	2.6	21,489	14.0	20,009	13.1	107,506	70.0	149,004	97.0
Per shop	380,561	5,828	...	36,154	...	160,385	...	488,035	...	2,067,426	...	656,405	...
Per wage earner	2,877	1,570	...	2,049	...	2,633	...	2,765	...	3,026	...	2,926	...
Wages paid [‡]	66,179	305	0.5	2,415	3.6	10,165	15.4	9,020	13.6	44,274	66.9	63,459	95.9
Per shop	164,215	4,613	...	21,960	...	75,558	...	220,005	...	851,418	...	279,555	...
Remainder ^{§§}	87,187	80	0.1	1,562	1.8	11,324	13.0	10,989	12.6	63,232	72.5	85,545	98.1
Deductions ^{**}	37,823	35	...	678	...	4,913	...	4,767	...	27,434	...	37,114	...
Per shop	93,853	533	...	6,189	...	36,670	...	116,270	...	527,539	...	163,490	...
Per wage earner	712	143	...	349	...	602	...	659	...	772	...	729	...
Residue [¶]	49,364	45	0.1	884	1.8	6,411	13.6	6,222	12.6	35,798	72.5	48,431	98.1
7% interest on capital ^{**}	16,173	48	0.3	453	2.8	2,426	15.0	2,119	13.1	11,127	68.8	15,672	96.9
Net residue [¶]	33,191	—	3	431	1.3	3,985	12.0	4,103	12.4	24,671	74.3	32,759	98.7
Per shop	82,362	—	46	3,918	...	29,739	...	100,073	...	474,439	...	144,339	...
Per wage earner	625	—	12	222	...	488	...	567	...	694	...	643	...

*Expressed in thousands of dollars.

[†]Distributed among the groups in proportion to value of product.

[‡]Distributed among the groups in proportion to number of wage earners; average per man, \$1,246.

[§]Value added by manufacturer, less wages paid.

[¶]Salaries, contract work, rents, federal and state taxes; distributed in proportion to "remainder" just above.

per cent of the added value. The small machine tool shops, almost 44 per cent of the total number, produce only 3 per cent of the added value with their proprietors and 4 per cent of the wage earners.

Note the concentration of 70 per cent of the added value in about 13 per cent of the machine tool shops, that averaged \$2,000,000 of added value, and \$3,000,000 of capital. Nobody ordered this concentration; it developed very naturally. Consolidations have been very few in the industry, though these very figures show that some consolidations or mergers would probably be advantageous. These shops "just grew" from within, as the industry has not been a good hunting ground for profits that would attract much outside capital. The machine tool industry did not breed millionaires over night: it got its million dollar shops, and its half million dollar shops and its hundred thousand dollar shops by grinding thrift and hard work.

To the man who dreams of becoming a leading machine tool builder, the figures seem to say "First join the \$3,000,000 club, or you will not be in the class that does the bulk of the business, and gets the best profit." Of course, he would need a few other things, like good designs, organization, selling outlets and reputation. His \$3,000,000 alone will not put him in the running, for mere money will not buy the years it has taken all these concerns to get to wherever they are now. Every one of these concerns was started on a small scale, but today the machine tool business has reached such a stage of necessary magnitude that a small business is greatly handicapped. A man with only a little capital would better hunt somewhere else for a place to exercise his talents, rather than by starting a new machine tool shop. If he feels an overwhelming urge to get into the business, or to stay in it, he would very likely do better to invest his money and use his talent in some established concern that has over \$25,000 invested now, and has a reputation and a chance to increase.

The machine tool builders in the \$1,000,000 class get their profit by running an irregular business with nearly 700 skilled men making a variety of product,

class. Again, 33 per cent of machine tool men are in the \$150,000 class while only 13.7 per cent of the average are in the \$100,000 class. And only 44 per cent of adventurous machine tool builders are in the two lower classes, compared with 79.5 per cent of all manufacturers in those classes, and the figures seem to indicate that such small shops in the machine tool business must have very hard sledding.

(To be concluded)

Officers of Engineering Foundation

Charles F. Rand of New York, mining engineer and owner of iron and manganese mines, has been re-elected chairman of the Engineering Foundation, which is directing in cooperation with the National Research Council, a national program of industrial research.

Edward Dean Adams, New York, was chosen first vice-chairman of the board, and Frank B. Jewett, president of the American Institute of Electrical Engineers, was elected second vice-chairman. Joseph Struthers is treasurer and Henry A. Lardner assistant treasurer. Alfred D. Flinn was re-elected director. Dr. W. F. M. Goss, president of the Railway Car Manufacturers' Association, was elected to the foundation board to succeed George M. Basford. Col. Arthur S. Dwight, past president of the American Institute of Mining and Metallurgical Engineers, was chosen to the board to succeed Edwin Ludlow. Other members of the board for the coming year include E. Wilbur Rice, Jr., president of the General Electric Co., Schenectady, N. Y., and Elmer A. Sperry, Sperry Gyroscope Co., Brooklyn, N. Y.

The foundation, established in 1914 through a \$500,000 gift of Ambrose Swasey of Cleveland, will, it is announced, cooperate during the coming year with universities, State and Federal Governments and other agencies in prosecuting nationally a plan of industrial research, which is called essential to American industrial supremacy.

Kansas Industrial Act Is Defended*

Its Operation During Railroad and Coal Strikes Explained —No Prospect That It Will Be Seriously Crippled by New Legislature

BY WM. L. HIGGINS†

WE have done two new things in Kansas. First, we have extended the list of the businesses which are impressed with a public interest. We have kept the old list, the railroads and the public utilities of all kinds, the banks and the trust companies and the grain elevators, but we have added two things. We have said the production of fuel is impressed with a public interest, and I have never found a man yet to deny that. I guess you know it here in Indiana. When there is no coal in the bin and the cold weather comes on, it is a matter of public interest. When there is no coal to provide fuel to create steam to operate through the steam engine that Jamie Watt invented, and you don't have transportation because you don't have fuel to make the steam to pull the trains, it is a matter of public interest.

In Kansas, by a legislative declaration and court decree, the production of fuel is impressed with a public interest. The manufacture of food products is also impressed with a public interest because under modern conditions that is the case. You have a more polite name for it here in Indianapolis. I have been talking with some of you and you call it an abattoir.

Provisions as to Fuel and Food

In Kansas, by legislative declaration and by court decree, the packing plant and the stockyards adjacent thereto are impressed with a public interest, not only because they produce a necessary food for the public, but also because they furnish practically the only market for the farmers' live stock, and we are strong for the farmers out in our State.

We say the same thing about the flour mills because we produce a lot of wheat and a great many of our farmers are interested in the price of wheat.

So, we have said by legislative declaration, and we have got it now by court decree, that the production of fuel and the manufacture of food is impressed with a public interest.

Treatment of Labor and Capital

But here is another thing that we did that was revolutionary, we are told by our opponents. We said that capital invested in these essential industries is impressed with a public interest, but that is only half the story. Why penalize capital and compel it to go on and run the trains, for instance, and let labor by a strike stop the trains? If the people out there in one of those towns in central Kansas where they have no timber except a few shade trees and no fuel except what is shipped in on the railroad coming from the coal mines, find that they are out of coal and they have to shut down the electric light plant because there is no fuel and go back to the tallow candle, but if they find that their homes are cold and there is no coal and no way to heat the houses, and they can't hold prayer meetings because the church is cold (and that is tough on us people out there)—what difference does it make to them whether that shortage of coal is caused by the refusal of the owners of the mine to operate or by a strike of the workmen which stops the production of coal?

So we have done the unheard of thing out there and said, "Not only is capital invested in these essential industries impressed with a public interest and owes the public a duty, but labor is likewise impressed with

a public interest." We can't go so far as to say, "You have to work," because of the thirteenth amendment to the Constitution of the United States. We can't say to you, "You have got to work," because that would be involuntary servitude. What we do say is, "You can quit, but you can't make the other fellow quit."

By the mere enforcement of the anti-picketing feature of the industrial act, Kansas a year ago last December saw the great nation-wide packing house strike—abattoir strike—pass by unscathed our packing houses which were operated constantly. The market for live stock in our great packing center, Kansas City—and remember now that Kansas City goes over on both sides of that line, and we have pretty nearly as much of it on the Kansas side as they have on the Missouri side, and the abattoirs are on our side—operated efficiently. There wasn't a day during that great strike that any Kansas farmer might not start his live stock for the Kansas City market with full assurance that it would be bought at current prices and disposed of. I have it on good authority that live stock was shipped into the Kansas City market from the Omaha district, from the Des Moines district and from the Oklahoma City district, because our packing houses were operating efficiently and they could be disposed of there.

The Shopmen's Strike

During the great nation-wide shopcrafts strike of last summer, Kansas people saw the railroad shops of Kansas operating efficiently—not with full efficiency at first, I don't claim that; it took a little while to get in the new men and train new men—but operating with practical efficiency. It is true, ladies and gentlemen, that in some places it was necessary to send down a number of our young Kansas citizens of approved physical condition and good moral character in the uniform of the National Guard in order to protect men who wanted to work. We had to do that a little, but we had the law to do it with. But not a train was taken off in Kansas because of the strike, and Kansas people saw her greatest railroad, the Atchison, Topeka & Santa Fe, doing the biggest business in freight and passenger departments from July 1 until Oct. 1, 1922, that that great system had ever done at any time in its history between the Rocky Mountains and the city of Chicago.

The Kansas people saw the law approved and sustained by their Supreme Court by unanimous decisions on all its essential features, administered in such a way that we didn't get much farther with our coal strike than you did. I say that with regret, but the reasons for that condition are pretty well understood by well-informed people, and I have confidence they won't occur that way again.

Will Not Repeal Law

I am saying this partly because it has been heralded all over the country that it is all over out there except the funeral and the mourners have been sent for. Well, that is a mistake. There isn't the remotest possibility that the legislature now in session will repeal or seriously cripple the industrial act. They had a vote in our State Senate composed of 40 members a few days ago on a resolution memorializing Congress to pass a national law similar to the Kansas industrial law, and of the 36 senators who voted—four of them were not in the Senate chamber at the time—31 voted in favor of that resolution, five voted against it.

To say more at this time would be to boast and would be to take up too much time. The Kansas indus-

*Abstract of an address delivered at the annual meeting of the Associated Employers of Indianapolis, Feb. 15.
†Presiding Judge of the Kansas Court of Industrial Relations.

trial act is composed of 30 sections. It is in reality a brief industrial code. It is the best we could do in the way of an industrial act. It is not hasty legislation. It was prepared with the greatest care. But Indiana might pass a much better one. Indiana, Ohio or Pennsylvania might improve upon it greatly.

NO RELIEF IN SIGHT

Immigration Legislation Doomed—Labor Shortage in Steel Plants May Become Serious

WASHINGTON, Feb. 27.—The effect upon the iron and steel, foundry and other basic industries, through a shortage of labor again has been recited by manufacturers, this time before the Senate Committee on Immigration, when they appeared last week and endorsed the bill of Senator Colt, which bases immigration quotas on the net movement of aliens, and allowing the Secretary of Labor to admit aliens after the quotas have been filled in case of emergency. The measure is along the line of that sponsored by the National Association of Manufacturers and the American Farm Bureau Federation. However, immigration legislation at the present session of Congress, which officially comes to an end next Sunday, evidently has fallen by the side along with other important legislation such as the ship subsidy bill.

The present session of Congress developed a genius for throwing aside important legislation and enacting unimportant as well as extravagant measures. The present Congress will not go down in history as being notable for any great accomplishment, however favorable its showing may be, compared with the radical incoming Congress, which will be seated next December. Meanwhile, the country will at least enjoy a rest from zealous activities of national legislators with all sorts of curious ideas of statesmanship. It will be the first time for a number of years that Congress has adjourned March 4 with no probability of another meeting until the regular session in December.

The Johnson Bill

Returning to the matter of immigration, it is evident from the report of the House Committee on Immigration that the bill of Chairman Johnson, which the majority report favored, comes more nearly reflecting the attitude of Congress on this subject than does the Colt bill, as badly as industrial interests claim additional labor is needed.

R. M. Welch, assistant to the president of the Youngstown Sheet & Tube Co., Youngstown, Ohio, in appearing before the Senate committee, said that the iron and steel industry is suffering from a lack of labor, which cannot now be obtained. It was his opinion that the shortage in the Youngstown district is typical of all the steel plants in the Middle West and that the Colt bill would be of great help if not an entire solution to the whole problem. C. L. Patterson, secretary of the Labor Bureau of the National Association of Sheet and Tin Plate Manufacturers, said that the sheet and tin plate industry represented by the association now employs 53,200 men and needs more than 10,000 additional in order to operate at capacity.

A. E. McClintock, representing the National Founders' Association, said that the foundries are unable to enlarge operations because of shortages. Present operations, he said, are at the rate of approximately 65 per cent of capacity. Frank W. Noxon said that the railroad equipment makers face a shortage of 31,083 workers at present, the midst of the winter season, and predicted that when revival sets in in the spring, there will be a shortage of at least 200,000.

James A. Emery, general counsel of the National Association of Manufacturers, told the committee that the manufacturers did not maintain that there was a general shortage of labor, but that it is seriously threatened, and for this reason he urged passage of the bill, but said that the manufacturers favor selective immigration rather than lifting the bars to all classes

At any rate, are we going to throw up our hands and say that government is powerless to prevent industrial warfare? If we are, it is equivalent to saying that democracy has failed, and we ought to begin at once to look around for some other form of government.

of aliens, some of whom cannot be assimilated into American citizenship.

The 2 Per Cent Bill

Admission of from 60,000 to 75,000 laborers, who shortly will be needed, will be prevented, in the opinion of Representatives Isaac Siegel, Robert S. Maloney and Adolph J. Sabath, expressed in a minority report on the House bill on immigration, which reduces the immigration quota from 3 to 2 per cent and the basic year from 1910 to 1890. Pointing out that it is not interested in supplying "cheap labor," but that it is deeply concerned in the welfare of the United States whose prosperity depends upon having at least a sufficient amount of unskilled labor, the minority report says this can be obtained in a measure by using the population figures of 1920 or 1910 as a basis in lieu of 1890. The bill would draw largely from Northern and Western Europe, rather than Southern Europe. Doubt is expressed by the minority that Northern and Eastern unskilled labor requirements can be drawn from the South without at the same time injuring the growing Southern industries.

"Surely, under the stringent provisions of the bill," says the minority report, "no temporary common labor can be obtained from Mexico as was done in 1918 and 1919 to relieve shortage of labor in cotton and sugar-beet fields in Southern and Southwestern States.

"It cannot be truthfully denied that most of the hard, common, and manual work performed in the United States has been done during the past 30 and 40 years by immigrants coming from those countries designated as Southern and Southeastern Europe. Such work for the past century has always been performed by the then coming immigrants."

It is declared that since the enactment of the present 3 per cent quota law it has been shown that many of the fears about an influx of immigrants have proven to be unfounded because several of the countries have not even made full use of their quotas. The 3 per cent law would have permitted the coming of over 355,000 immigrants, but last year only 309,556 arrived.

Pittsburgh Plus Hearing

G. L. L. Davis, for 13 years vice-president in charge of sales, Scullin Steel Co., St. Louis, was the last witness to be examined in the Pittsburgh basing point hearings at Chicago, prior to adjournment on Feb. 21 until March 12. Mr. Davis explained that the main business of the Scullin Steel Co. was the manufacture of steel castings, and that it operated its mill only when it could secure a profit. The mill was completed in the fall of 1920 and has a capacity of 7500 tons of bars and shapes per month, which will be increased to 10,000 tons following the completion of additional ingot heating facilities. The mill has operated intermittently and Mr. Davis stated that the company did not expect to operate it continuously. In fact, to obtain a profit, he asserted it was necessary for the company to obtain a price equal to the Pittsburgh base price plus the freight, or higher. The company's mill costs are no higher than that of any other manufacturer, he added, but higher costs lie in the manufacture of the ingots.

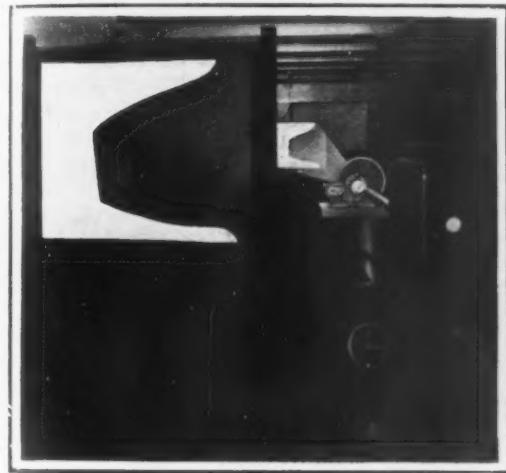
Industries at New Castle, Pa., almost without exception, report a labor shortage which employers expect to be accentuated in the spring, when road work, building and other forms of outside employment will draw men from the mills and factories. In the Mahoning and Shenango valleys labor shortage, especially of common labor, has retarded production in most departments of steel plants.

Comparator Modified to Inspect Gears

The Hartness screw thread comparator of the Jones & Lamson Machine Co., Springfield, Vt., has been modified to extend its field of application in the inspection of gears and other irregular profiles. Both gears and threads may be inspected on the same machine, the capacity of which has been increased to accommodate threads and gears up to 20 in. in diameter. Convenience of control is also a feature.

On gears or large profiles where a low power lens, reduced magnification, is necessary, the shadow is projected onto a 20 x 24-in. mirror which is silvered on its front face. The shadow is reflected back to a 36 x 44-in. ground glass screen at the side of the machine, as shown in the illustration, where the operator can manipulate his work and also have the advantage of a large shadow at a convenient distance from his eye. With this arrangement he may conveniently study the profile of work or the rolling section of the gear.

The work table of the machine is 18 in. long by 7 in. wide and can be compounded 45 deg. either side of center. The light source and lens system are in a self-contained unit, which rides vertically and is controlled by a rack and pinion movement on a 5-in. diameter



column. Either incandescent lamp or carbon arc are available as a light source.

The machine is equipped with a fixture for mounting centered work, taps, gages or hobs, a view of the fixture as used for inspecting the latter being shown in the separate illustration. The hob is mounted between centers. A tooth is projected into a true outline on the screen and error in its form may be readily detected. A size block may then be inserted between the stop in the carriage and the micrometer anvil in the base. A tooth spaced equal to the thickness of the size block should fall into the outline on the screen. If the lead is long or short, the shadow will be displaced from the outline equal to the error in pitch. Production screws are inspected the same as in the original Hartness screw comparator.

The lenses required to meet this special problem of the projection of irregular shaped opaque objects were designed by Dr. C. S. Hastings of Yale University. He has been successful, it is said, in freeing the shadow images of sensible distortion, and at the same time preserving sharp definition with the minimum of outstanding color. The lenses are made by the T. H. Brashear Co., Pittsburgh. They are available in three powers, the highest power lens, 38 mm., projecting an area $\frac{1}{2}$ in. in diameter, the next lower, 82 mm., $\frac{1}{4}$ in. in diameter, and the lowest power 123 mm., projecting large work up to $1\frac{1}{2}$ in. in diameter.

The Youngstown Sheet & Tube Co., Youngstown, has placed its new No. 3 universal mill in operation, displacing the old No. 3 skelp mill, which will be discarded. The new unit is motor driven and has a much larger tonnage capacity than the old one.

British Workingmen Seek Employment in United States

HARRISBURG, Pa., Feb. 26.—Requests for employment are being received at the offices of the Employment Bureau of the Pennsylvania State Department of Labor and Industry from highly skilled British mechanics, many of them expert iron and steel workers. According to a bulletin of the department in which the arrival of these men in Pennsylvania was noted, approximately 2000 such British workers are arriving each month in United States and Canada.

Unemployment in England is reported to be responsible for the exodus, which has assumed such proportions that the British Government is understood to contemplate an embargo. The men, many of them from Glasgow and Clyde, arriving in Pennsylvania, chiefly in the Philadelphia district, have reported that they have been without employment for 17 months.

Iron and steel mills throughout the State are operating virtually at capacity, according to reports received at the State offices here. There are few unem-

Comparator For Inspecting Threads and Gears Up to 20 In. Diameter. Inspection of a gear tooth is shown at left, and set up for hob at right

ployed iron and steel workers in any of the employment districts. The outlook is bright.

Philadelphia is in need of many kinds of mechanics. The New York Shipbuilding Co. has made heavy demands for structural iron assemblers, layers out and shear men. Molders are in widespread demand.

In Reading there is demand for men willing to learn the molding trade. The Reading Foundry & Supply Co. is reported ready to take on any number of men willing to learn it.

Rolling Plates in India

At the plant of the Tata Iron & Steel Co., Jamshedpur, India, the No. 2 battery of Wilputte type of by-product coke ovens is now in commission and two more batteries are under construction. The battery consists of 50 ovens with a capacity of about 550 tons of coke daily. Batteries 1 and 3 will be in operation toward the end of 1923.

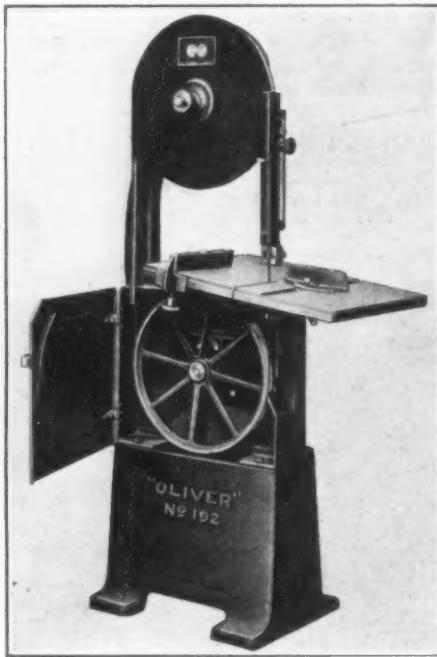
The first steel plate from the first plate mill in India was rolled in the plant of the Tata company on Dec. 29, when a test was made under the supervision of T. W. Tutwiler, general manager, and E. A. Proctor, chief works engineer, who superintended the construction of the mill. It is declared the trial was successful. Slabs were rolled down to $\frac{3}{8}$ -in. plates. The mill is designed to roll plates ranging from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in thickness, and in widths up to approximately 90 in. The mill has a capacity of 3000 tons per month on an 8-hr. day and will be placed in regular operation as soon as the new open-hearth tilting furnace is in shape to supply ingots. The mill, it is claimed, will make India independent of foreign sources for plates.

New Portable Band Sawing Machine

A new self-contained portable band sawing machine fitted with motor, and of special interest perhaps to pattern shops, has been added to the line of the Oliver Machinery Co., Grand Rapids, Mich. A feature is the large cast iron table with miter cross cut gage and parallel ripping fence, which are intended to increase the usefulness of the machine. The motor is driven from an ordinary lamp socket.

The machine takes 18 in. between the saw and column, 8 in. high under the upper guide, and can accommodate saws up to $\frac{1}{2}$ in. wide. With the gages the machine may be used to rip up to 11 in. wide and cross cut and miter up to 8 in. The table tilts 45 deg. to the right.

The wheels of the band saw are of cast iron, 18 in.



Portable Band Sawing Machine. Large table, with miter cross cut gage and parallel ripping fence, are features

in diameter, $1\frac{1}{4}$ in. face, covered with rubber. They are mounted in ball bearings and run at a speed of 770 r.p.m. The upper wheel has 4 in. vertical adjustment. Both wheels are guarded by steel doors as shown in the illustration. The table is the same as in the company's large machines, and is 24 in. wide and 20 in. long. The height of table from the base is 20 in., and from the floor 38 in., when supported on the floor base. Frictionless roller guides having but four major parts are provided below and above the table. The saw runs against the outer edge of a hardened wheel which revolves against a ball bearing. The side guides or lips are of hardened steel, are adjustable and prevent turning of the saw edgewise.

The lower wheel has a non-changing alinement with the frame of the machine. The upper wheel has a 4 in. vertical screw adjustment for tensioning the saw and a delicate micrometer screw tilting device for tracking the saw on the wheel. All adjustments are controlled by handwheels.

The lower wheel shaft is driven through a reduction gear box with a hard steel pinion and composition spur gear running in an oil bath. The driving shaft at the upper end of the gear box is connected to the motor by a flexible coupling. In the belt driven machine this shaft is supported by an outboard bearing and carries the tight and loose pulleys. A $1\frac{1}{3}$ hp. 1800 r.p.m. motor is employed and is fitted with ball bearings. It may be run from a lamp socket on a lighting circuit or may be furnished for the power circuit.

The space occupied by the machine is 22 x 34 in. The weight of the motor-driven saw is 625 lb. crated.

The machine is designated as the No. 192 and is available also without the floor base, for mounting on a bench. The belt driven machine is easily convertible into a motor driven unit.

British Cast Iron Research Reports

The British Cast Iron Research Association, in its monthly circular for January, reports that the arrangements for definite research outlined in the December circular have been completed by the appointment of two research assistants, E. C. Dickinson, who will work at Sheffield University, and H. J. Simcox, to work at Birmingham University. The following problems have been investigated by the association and reports furnished thereon during the past month: "Chrome in Cast Iron"; "Semi-Steel Mixtures"; "Elimination of Sulphur in Malleable Castings"; "Mixtures for Firegrate Bars"; "Combustion Chamber Casting Mixtures"; "Electrical Resistance of Malleable Cast Iron"; "Mixtures for Special Heavy Castings"; and "Special Chilled Iron Rolls." Oliver Stubbs of Manchester has been appointed chairman of the executive committee of council and F. J. Cook of West Bromwich has been appointed chairman of the research committee. During the past month several large firms have joined the association, and the revival of trade is shown by the increasing use members (particularly large firms) are making of the assistance of the association in the solution of difficulties that arise in their foundries.

Exports of Water Wheels and Turbines

December exports from the United States of hydraulic power generating apparatus are reported by the Department of Commerce at a total of 22 units valued at \$96,962. All of this equipment went to Latin America, Brazil and Venezuela accounting for more than 91 per cent, as is shown in the appended table:

Destination	Under 500 hp.		500 hp. and over	
	Number	Value	Number	Value
Guatemala	1	\$7,731	2	\$39,564
Brazil	1	8,250	..	..
Ecuador	1	660	..	..
Venezuela	17	40,757	..	..
Total	20	\$57,398	2	\$39,564

Japanese Imports of Iron, Steel and Machinery

WASHINGTON, Feb. 27.—Imports of iron and steel into Japan in January were valued at 4,100,000 yen, according to a cable received by the Department of Commerce from Commercial Attaché Abbott. Imports of machinery and parts were valued at 7,700,000 yen. The present value of a yen is between 48 and 49 cents.

The Powell Pressed Steel Co., Hubbard, Ohio, is offering an issue of \$200,000 of 8 per cent cumulative preferred stock, and will use the proceeds for plant extensions and additions to working capital. The company already has outstanding \$250,000 of a \$300,000 common stock issue. The company is booked ahead for about one year. It is installing a large number of new presses and is contracting for others. The company has contracts with the Durant Motors calling for \$2,000,000 worth of products annually. It also supplies pressed and stamped metal products for the agricultural and railroad fields. It is a substantial consumer of steel sheets and plates up to three-quarter inch thick.

Edgar Thomson works, Braddock, Pa., won the 1923 Carnegie Steel Co. safety trophy for January and thus will be in possession for February of both the 1922 and the 1923 trophies. It was awarded the trophy for lost time accidents as compared with the average of January on a showing of a 91.4 per cent reduction in January accidents for five years at that plant.

Export Trade in the Light of Iron Costs*

How Item of Freight Rates Works to Check Aggressive Drives for World Iron and Steel Business

BY PAUL M. TYLER

WHILE it may perhaps be too early to draw definite conclusions as to the future costs of producing iron and steel in Europe, it is of interest to observe to what extent the cost of raw material components delivered at the works have approached the so-called normal of prewar conditions. In some cases, as has been pointed out in the foregoing, European prices are actually lower now than they were in 1913.

What is perhaps of even greater significance is that prices abroad are generally much nearer prewar levels than are those in the United States. Despite the wage increases in all countries the price of ore at the mines is but little higher than before the war, and even fuel prices have been deflated to a very large degree. As compared with American conditions, however, the outstanding difference is not that the deflation of prices at the mines has been more effectual in Europe but rather the fact that prices of raw materials delivered at foreign iron and steel works have come down to where other countries now have a much greater advantage than they enjoyed before the war.

Freight a Heavy Burden in United States

The reason for this situation is quite obvious. There is scarcely a country in Europe where a haul of 200 miles is not considered excessive on raw materials, whereas in the United States even fuel is often carried longer distances and Lake ore commonly traverses a distance of a thousand miles. Even in prewar days, when railroad transport was cheaper per ton-mile here than in any other country, freight constituted a very large item in the cost of making iron and steel and a larger item in this country than it did abroad.

In the case of the Eastern pig iron manufacturers before the Interstate Commerce Commission last year (Barrows exhibit E), it was contended that the total transportation charge on 3.6 tons of raw material decreased from \$8.36 in 1901 to \$7.37 in 1915. Although the latter figure was the minimum indicated freight cost in any year it constituted more than 50 per cent of the sales price of pig iron in that year and, as the total value of the ore, flux, and fuel required to make a ton of iron was then only \$5.70 as calculated from the cost at their respective points of origin, it is evident that freight charges actually amounted to 30 per cent more than cost of the materials.

Put in another way, transportation cost constituted 56.5 per cent of the total cost of the raw materials

*Subject was introduced by the author, who is a consulting metallurgist, Washington, in the issue of Feb. 15, and continued in the issue of Feb. 22. He compared pig iron making costs in the United States, Great Britain, Belgium and Lorraine, before the war and today.

Pig Iron Costs

<i>Before the War roughly as</i>	<i>Today roughly as</i>
<i>1.0 in the United States</i>	<i>1.0 in the United States</i>
<i>to 0.7 in Lorraine</i>	<i>to 0.53 in Lorraine</i>
<i>to 0.9 in Belgium</i>	<i>to 0.65 in Belgium</i>
<i>to 1.13 in Great Britain</i>	<i>to 0.63 in Great Britain</i>
And High American Freight Rates Are Largely Accountable	

laid down at the furnace before the war increases in rates were made. In 1920, and until the reduction of July 1, 1922, the cost of freight alone on raw materials delivered to these furnaces averaged more than \$13 per ton of pig iron. Allowing for the 10 per cent reduction of last year and certain readjustments in ore supply, it is likely that most of the merchant furnaces in the eastern part of the United States now have to

pay more than \$10 in freight for every ton of pig iron they make, or about 75 per cent more than they did before the war.

While the burden of increased freight costs on raw materials has not been quite so heavy on furnaces located in the Central Western States, it is reasonable to assume that at the average American furnace the freight on raw materials now amounts to very close to \$9 per ton of pig iron, whereas \$5 was the commonly accepted figure

before the war. Existing rates on coke are in the neighborhood of 75 per cent higher and ore rates are over 60 per cent more than they were in 1913.

Definite comparisons are almost impossible to secure at present, but it is fairly certain that even now American railroad freight charges per ton per mile are lower than those of any other country except Germany, where transportation subsidies have constituted an excessive drain upon the resources of the government. Before the war the cost of railroad transport per ton-mile was 60 to 70 per cent higher in France and Germany than it was in the United States, and about two and a half times as much in England as in this country. It was this condition, coupled with the remarkably cheap movement of ore on the Great Lakes, which aided the American iron and steel industry to assemble its raw materials at a cost which did not unduly handicap it in competition with the industries in foreign countries, despite the long distances over which these materials had to be carried.

Increased transportation costs, however, have upset the balance. While foreign rates have likewise increased, and in some cases to an extent even greater than those in this country, nevertheless, the effect upon the iron and steel industries of Europe has not been so serious as it has been in this country, because freight charges over there have never been so dominant a factor in production costs.

Short Rail Hauls in Europe

In England the maximum ore haul is on the West Coast, where it amounts to 100 miles; in other sections of Great Britain the blast furnaces are either at seaboard or adjacent to domestic sources of ore supply and always within a few miles of coke. The average haul

on raw materials is probably not more than 25 or 30 miles in any of the different districts, and is usually much less. On the Continent, while the distances are in many cases greater than they are in England, the cost of transport on raw materials is frequently less than half what it is in the United States.

When it comes to export trade, the American industry is at a still further disadvantage in the form of the railroad hauls from its inland furnaces to seaboard, since most of the larger foreign plants (and practically all those that do any considerable export business) are much more advantageously situated for shipment of their products overseas. In this connection the views of Francis C. Hood of the National Federation of Iron and Steel Manufacturers (Great Britain) are of interest. While seeking some of the data used in the present article some time ago in London, the writer received valuable assistance from Mr. Hood, who, in common with several of his colleagues in the federation, is exceptionally well informed as to the international situation in the iron and steel trade. In a careful study of present trade tendencies, published in the *Manchester (England) Guardian*, he says:

"In export trade the Pittsburgh manufacturer is handicapped by the fact that it costs \$5 to \$7 to send a ton of finished steel from the works to the nearest seaport. Although she produces one-half of the total world output of steel, America will not swamp the world market in steel. In the Canadian market she is, and will remain, supreme; in other markets, and notably in Japanese and South American, she is a formidable competitor. A more continuous interest is taken in export business than before the war, and the danger is thereby increased that a depression in the home market may lead to an inundation of the world market by American steel. But the hard facts of geography make America a competitor and not a dictator in the world steel market."

Europe Has Little Surplus Iron or Steel

From the cost data now available and which have just been summarized in this article, it might be readily contended that the American iron and steel industry would not only fail to become a dictator in the world market but even that she would have trouble in meeting foreign competition in her home markets. Despite the temptation to do so, it should be remembered that it is dangerous to draw definite conclusions as to the extent and direction of future trade.

On the basis of indicated costs, it would be quite possible to prove that foreign iron and steel would be piled up on our shores in ever increasing quantity and be carried even to our remotest inland markets. But there are other factors than existing costs, as may be inferred from the fact that only two or three years ago American steel was the cheapest in the world, although now it is about the most costly. While it is true that the costs of producing iron and steel all along the line are probably less abroad than they are in the United States, this condition is not of itself alarming, at least for the moment.

Europe has had her hands full to keep her industries going at all. Never since the war has there been a huge surplus for export and, when the world was clamoring for steel and when it was able and willing to pay almost fabulous prices for its most urgent needs, European countries could spare but trifling amounts as compared with their prewar exports. Now, after more than four years, England and Belgium have apparently reorganized their industries so as to engage actively in export trade, but France has not yet been able to assume the position which she should rightfully have inherited when she gained control of German mines and plants under the Treaty of Versailles.

Not only has reconstruction absorbed a large

amount of steel for home consumption in France, but also the critical state of fuel deliveries has limited her output to a point which leaves a relatively meager surplus for export. The loss of Lorraine leaves Germany with scarcely sufficient furnace capacity to supply the needs of her own consuming industries. The acquisition of machinery works by steel manufacturers indicates a well-advanced tendency toward the development of a comparatively few, highly integrated corporations which, while they produce large quantities of steel and iron, will have very little to spare over what they themselves employ in the manufacture of highly fabricated articles; in fact, there is cause to believe that there may be a deficit for Germany as a whole.

Outlook

For the immediate future it would seem that England and the export unit which comprises the industries of both Belgium and Luxemburg will have the lion's share of the export markets of the world. The Ruhr situation, however, will have a profound influence upon the output of all Continental countries and a stoppage of coal production or distribution from that area will eliminate not only France and Germany but also Belgium and Luxemburg from export trade. Provided she can secure a dependable supply of fuel from Westphalia, however, France should gain a larger slice of international business in competition with American exporters.

On the basis of conditions existing before the occupation of the Ruhr, it would seem that export trade would prove much less profitable in the United States than in England or Belgium, and that this condition would continue for some time. The price of coke in this country doubtless will be considerably reduced before long, and eventually ore and limestone may be a trifle cheaper at the mines and quarries, but the main obstacle in equalizing costs of production here and abroad is the burden of much higher freight rates than were anticipated when the sites for most American plants were chosen.

Agricultural Implement Exports in 1922

Two-thirds of all our 1922 shipments of agricultural implements went to three countries—Canada, Argentina and France—and ten countries absorbed 85 per cent of the total, according to the figures of the Department of Commerce. The first three countries occupy the same relative positions as in 1921. In 1920 the order was Canada, France and Argentina; in 1919, France, Canada and Argentina.

The ten principal buyers of this type of machinery will be found tabulated below. Of the exports to Canada the principal articles were tractors and threshing machines, while to Argentina the principal items were threshing machines, harvesters and reapers and plows.

Canada	\$9,440,084	United Kingdom	\$1,115,816
Argentina	5,360,845	British S. Africa	697,371
France	3,918,377	Cuba	410,443
Mexico	1,781,979	Spain	396,557
Australia	1,298,704	Brazil	394,843

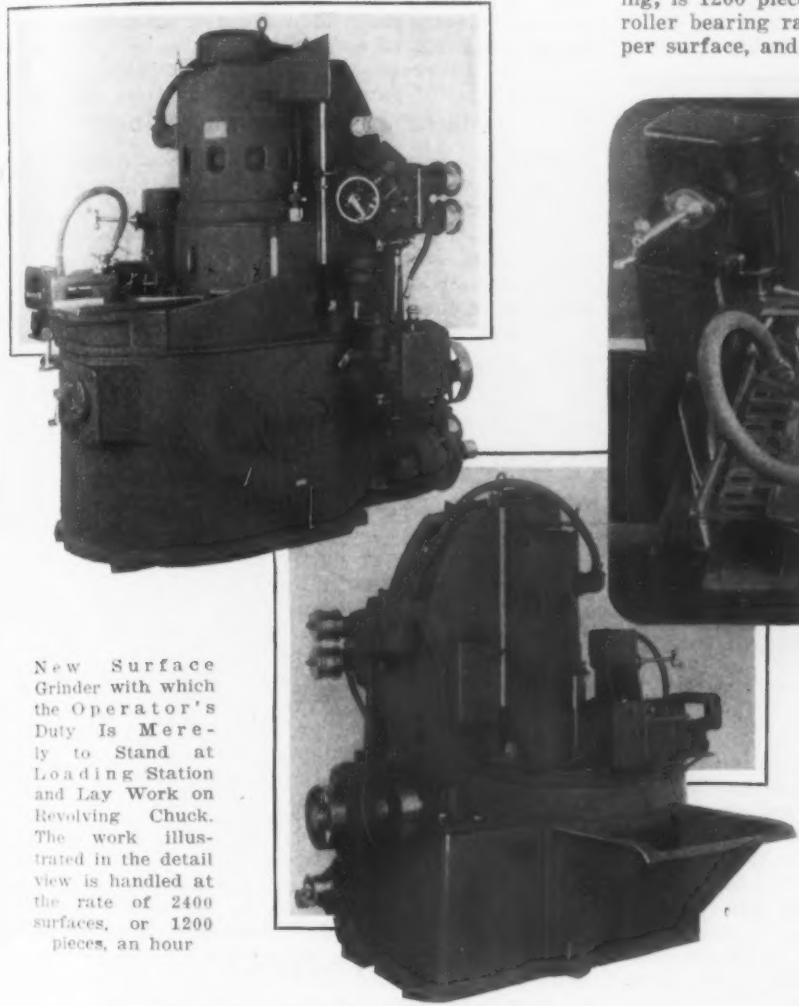
The Detroit Foundrymen's Association held its February meeting Thursday evening, Feb. 15, in the Employers' Association rooms in the Book Building. The meeting was devoted to the subject of "High Strength in Castings." E. J. Lowry, metallurgist for Hickman, Williams & Co., gave the address of the evening, illustrating his talk with charts showing the effect of the various chemical elements in iron, and the result of mixtures and semi-steel on high strength iron.

One of every eleven stockholders of the General Motors Corporation is an employee as the result of distributing to 6000 of its employees 270,000 shares of common stock and 7600 shares 7 per cent debenture stock, given as a bonus in recognition of meritorious service. Approximately \$4,500,000 at current market prices is represented by the securities distributed.

NEW SURFACE GRINDER

Work Ground to Size, Measured, Unloaded, Demagnetized and Wheel-Head Adjusted Automatically

An automatic surface grinder, designated as the No. 16A, which automatically grinds the work to size, measures it, controls the adjustment of the wheel-head, unloads and demagnetizes the work, all without attention from the operator, has been brought out by the Blanchard Machine Co., Cambridge, Mass.



New Surface Grinder with which the Operator's Duty Is Merely to Stand at Loading Station and Lay Work on Revolving Chuck. The work illustrated in the detail view is handled at the rate of 2400 surfaces, or 1200 pieces, an hour

An automatic washing machine may also be added, so that the work is delivered to the holding receptacles, washed as well as demagnetized. The operator's duty is merely to stand at the loading station and lay the work on the revolving chuck. The machine is new in every respect and unusual possibilities for the quantity production of small work are claimed.

The operation may be understood more readily, perhaps, by following the course of work through the machine. The piece is laid on the rotating magnetic chuck at the loading position. There is no magnetism at the loading position and the piece starts around with the chuck, held in place by its own weight. Just before the piece reaches the water guards, shown in the detail illustration, it is held magnetically, and passing through an opening in the guards is carried under the wheel, which has been adjusted accurately to height by the preceding pieces.

In passing under the wheel the piece is ground to size. It then goes out through the water guards and under the wheel control caliper provided, which automatically sets the wheel-head to compensate for wheel wear which may have just occurred. After the piece has passed the caliper the chuck becomes non-magnetic and the piece leaves the chuck, passes through a demagnetizer and then down a chute to the holding re-

ceptacles. After the piece is removed the chuck surface is washed with water, so that it reaches the loading position clean and dry.

The operation is continuous, the pieces are placed on the chuck in the form of a continuous chain of work, as shown in the detail illustration. When producing up to 1200 surfaces an hour only one operator is necessary, but in excess of this quantity the part time of one helper may be needed, who can be used to serve three or more machines.

The work illustrated is a pipe wrench frame of malleable iron, on which the stock per surface is 0.015 in., and two surfaces are ground to limits of 0.002 in. plus or minus. The production per hour, with hand loading, is 1200 pieces or 2400 surfaces. On a 3 9/16 in. roller bearing race of hard steel, with 0.007 in. stock per surface, and one surface ground to limits of 0.002



in., the production is 1800 pieces, a dial type of load being used. The production on a ball bearing race 2 1/2 in. in diameter, of hard alloy steel, is 11,000 surfaces or 550 pieces per hour. In this case the stock per surface was also 0.007 in., two surfaces ground to 0.001 in. plus or minus, and a dial type of loader used.

The rotating magnetic chuck is of one-piece steel construction and is waterproof. It is magnetic only under the wheel and caliper, this

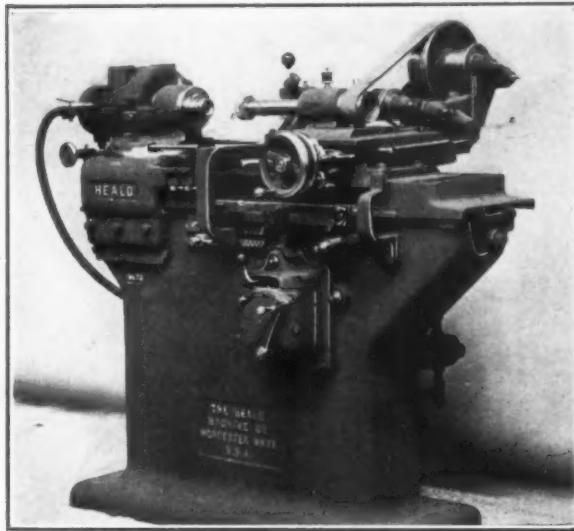
being said to be accomplished simply and without the use of sliding or movable contacts. The wheel control caliper is also of simple design and the wheel spindle is supported on ball bearings throughout. The demagnetizer is connected to the motor circuit and starts and stops with the motors. Controls are conveniently placed. Lubrication by oil bath is provided for important bearings and gears, and water guards serve to prevent the splash and spray of coolant. The base forms a tank which holds 180 gal. of coolant, and also acts as a settling pan from which the chips may be removed while the machine is in operation.

The annual exhibit of evening work in the school of science and technology of Pratt Institute, Brooklyn, N. Y., will be held on the evening of March 8. This season's courses include some forty classes in mathematics, industrial physics, electricity, technical chemistry, mechanical drawing, machine design, strength of materials, structural design, stationary steam engineering, automotive engine maintenance and repair, machine work and tool making, forge work, foundry practice, roof-framing and stair building. The enrollment in these evening courses now number 1162 men regularly employed in various vocations.

Heald Internal Grinder Equipped with Hydraulic Drive for Table

The Heald Machine Co., Worcester, Mass., has placed on the market an improved internal grinding machine known as style No. 72, which is offered as a production machine of maximum accuracy and unusual ease of operation. Hydraulic drive for the table, to permit wide variation of speed and instantaneous reverse, is a feature. The machine is gearless, driving gears and speed boxes having been eliminated. It is rated to swing work 15 in. in diameter and grind to a depth of 11 in. Work 12 in. in diameter can be handled inside of the standard water guard.

The hydraulic arrangement for the table drive is operated by oil. Movement of the table is controlled by



Internal Grinder With Hydraulically Operated Table. Table speeds are from 2 in. to 36 ft. per min. New wheel truing and sizing device, and belt tightener are features

the two levers, mounted on the base, shown in the front view illustration. The upper lever, of ball handle type, controls the direction of the table movement, and the lower is the throttle and speed control. The latter is moved to the left, the first position on the quadrant giving a table speed of 2 in. per min. and the last position, at extreme left, giving 36 ft. per min., various other speeds being obtainable between these points. The throttle lever may be moved from zero to the position of highest speed without damage to the machine. Adjustable dogs are provided for automatic reversal.

The work-head is a heavy casting, mounted on a bridge as shown, and is driven from a five-step cone pulley countershaft, providing five speeds for the work. The starting and stopping lever extends through the cover as shown, and is arranged to engage a friction clutch on the inside of the spindle drive pulley. Movement of the lever to the left engages the clutch, and to the right withdraws it. These movements at the same time start and stop the water supply. The work-head can be swiveled up to 45 deg. for taper grinding, and is graduated in degrees and inches of taper per foot.

The cross slide is mounted on the table, and carries the flexible idler and wheelhead. A positive stop permits the grinding to a given size without watching the dial, and fine adjustment is provided to compensate for wheel wear. The flexible idler with belt tightener is mounted on the cross-slide as shown, and consists of a flexible driving pulley which is mounted on ball bearings and is intended to keep the drive belt taut automatically. From the idler, the drive is to the wheelhead by an endless belt which runs over a spring belt tightener, said to maintain a belt wrap of 85 per cent and also reduce side strain on the wheel-head bearing.

The wheel-truing device incorporated is a feature, and is arranged so that it can be dropped into position quickly, and when not in use may be swung up and out of the way. Nineteen sizes of wheel-heads are avail-

able, which permits of having the proper size spindle for the work in hand. These heads are quickly interchangeable, and are equipped with a pulley of correct size, a feature intended to eliminate guesswork about wheel speeds.

The base is designed so that the lower part forms an oil reservoir, the weight of the oil being said to add considerably to the rigidity of the machine and help to absorb slight vibrations. The reservoir is entirely inclosed to keep dirt and other foreign matter from the oil. A shaft at the rear, mounted in ball bearings, serves to drive the water pump and also the oil pressure pump for the table drive.

The machine requires a floor space of 40 x 88 in. The length of the base is 59 in., and the chuck spindle is 46 in. from the floor. The speed of the countershaft is 600 to 620 r.p.m.

Materials for Manufacturing

While the import figures for November and December have not yet been made public by the Department of Commerce, a brief analysis is possible of the general character of imports for the first 10 months of the year, and of exports for the entire year 1922. Compared with similar figures for 1921 the information is contained in the table below. All figures are expressed in millions of dollars.

Groups	Exports		Imports	
	1921	1922	1921	1922
Crude materials for use in manufacturing....	984.0	981.3	689.1	926.6
Manufactures for further use in manufacturing	399.2	437.8	281.6	436.9
Manufactures ready for consumption	1626.0	1292.4	514.3	552.3

Imports of crude materials for our manufacturing plants were last year over a third more than those of 1921, and imports of partly manufactured goods for further manufacturing in the United States were over one-half more in 1922 than in 1921, while the imports of manufactured articles ready for consumption were not much more (barely 7 per cent) last year than in 1921. Exports of raw materials were practically the same in the two years, exports of partly manufactured goods were 10 per cent greater in 1922 than in 1921, but the exports of consumption manufactured goods in 1922 were only 80 per cent of those of 1921. The figures are an index of the increased manufacturing activity within the United States last year and of the diminished size of the exports.

Industrial Advertisers' Association Admitted to Associated Clubs

At a recent meeting of the National Commission of the Associated Advertising Clubs of the World a request was filed by Keith J. Evans, president of the Industrial Advertisers' Association, for the admission of that body as a department of the Associated Clubs. After some discussion, the National Commission voted unanimously to bring in the Industrial Advertisers' Association as a new department. This will add to the Associated Advertising Clubs a large group of industrial corporations that have hitherto taken no interest in general advertising. Last year the Industrial Advertisers' Association held one of the most successful department meetings in connection with the convention of the Associated Advertising Clubs of the World at Milwaukee. This year in June there will be another complete program at Atlantic City.

Engraving Steel and Copper Plate

WASHINGTON, Feb. 26.—The Department of Commerce announces that according to reports made to the Bureau of the Census the value of products of establishments engaged primarily in engraving steel and copper plate amounted to \$27,494,000 in 1921, as compared with \$24,209,000 in 1919 and \$13,786,000 in 1914, an increase of 13.6 per cent from 1919 to 1921 and of 99.4 per cent for the seven years from 1914 to 1921.

Mining and Metallurgical Engineers

Discuss Steel and Blast Furnace Subjects at Annual February Meeting—Drill Steel Investigation—Non-Ferrous Meetings

THE iron and steel sessions of the American Institute of Mining and Metallurgical Engineers, held as a part of the 127th meeting in New York last week, were poorly attended and were not characterized by as much interest as was manifested at the same meetings a year ago. The papers, for one thing, were not the kind that is calculated to develop active discussion. Then there is missed such broadly interested participants as the late Dr. Henry M. Howe and J. E. Johnson, Jr. The two steel sessions were held on the morning and afternoon of Wednesday, Feb. 21. The morning session lasted one hour and the afternoon session an hour and a half.

Galvanizing Malleable Iron

An interesting paper on malleable iron was presented by W. R. Bean, head of the research department, Eastern Malleable Iron Co., Naugatuck, Conn., under the title "Deterioration of Malleable in the Hot-dip Galvanizing Process." The results of the paper are those of the work of the entire staff of the research department of the company. The paper is well illustrated with photomicrographs and charts.

The investigation claims to show that the deterioration of malleable iron in the hot-dip galvanizing process is intimately associated with the amount of phosphorus and silicon in the iron. When the phosphorus and silicon are low, the malleable iron will withstand the process best with practically no deterioration. High phosphorus and high silicon irons are practically certain to be embrittled by galvanizing, but if the phosphorus is about 0.10 per cent, the silicon may be as high as 1.20 per cent without serious trouble.

One of the curves in the paper differentiates between irons liable and those not liable to deterioration so far as silicon and phosphorus are concerned, but attention was called to the fact that this curve is at best only an approximation. The investigation also showed that, in those irons that are embrittled, the deterioration by galvanizing is due to the thermal effect resulting from the quenching after the galvanizing operation. Below a certain combination of phosphorus and silicon contents, this effect is at least negligible, but above it becomes very marked. The exact mechanism of the deterioration, whether due to a species of internal strain, or a segregation of the silicon and phosphorus in some way at the grain boundaries, is not yet determined.

The authors submitted micrographic evidence which tends to demonstrate that fracture in the defective galvanized material is intergranular, an abnormal condition, while fracture in ungalvanized material is transgranular. In other words, the brittleness of such malleable as deteriorates in galvanizing is due to intergranular weakness. The means for eliminating galvanizing brittleness developed in this investigation are reported to have been found practicable from a production standpoint.

In a written discussion, Mr. Marshall of the Ohio Brass Co. said he was able, as a result of considerable experiment, to corroborate some points in Mr. Bean's paper, but he believed that the cause of the embrittlement was quenching from the galvanizing temperature and that if slower cooling were employed less embrittlement would result. He did not believe that composition was the only factor.

The question as to whether hydrogen played any rôle in the phenomena was raised, to which Mr. Bean replied that this might be true, but if so he believed it was due to hydrogen taken up originally and possibly oxygen and nitrogen. His experience was, however, that there is no difference between castings that have been pickled and those that have not been pickled. Mr.

Bean also stated, in reply to a question as to the difference between cupola and air furnace malleable, that no cupola iron had been used, but it was his opinion that the results would be essentially the same with either class of iron.

Dirty and Clean Steel

The subject of dirty steel was brought before the meeting by a paper by H. W. Gillette, chief alloy chemist, United States Bureau of Mines, Ithaca Field Office, Cornell University, Ithaca, N. Y. The title of the paper was "Application of Colloid Chemistry to the Production of Clean Steel," and was presented in abstract by the author, who said in part:

Dirty steel is a matter of definition which will vary with the point of view. Such steel is unreliable, especially in resisting fatigue. Dirt is present in the molten metal as an emulsion or suspension of colloidal nature. The processes of producing steel at present tend to destroy such suspensions but produce only relatively clean steel. The colloid chemist is acquainted with other methods of destroying such suspensions, but not enough is known of the fundamental properties of colloids in molten metals to permit of direct application of these methods. Such knowledge should be sought and the making of both steel and non-ferrous alloys should be studied from the colloid viewpoint.

The author defined clean steel as one containing nothing that is not in solid solution in the austenite field. No such steel has been made and perhaps never will be. Generally speaking, crucible and electric steels are cleaner than acid open-hearths, which, in turn, are cleaner than basic open-hearths, and these in turn cleaner than converter steel. But even electric furnace steel from careful and experienced makers is not always truly clean in the strict sense of the word. As Giolitti points out, molten steel is an emulsion of liquid steel and liquid or solid dirt, including sulphides, oxides, slag, etc., whether originally present or purposely introduced as scavengers. It is essential to the breaking up of emulsion that time be given for the steel to lie quiet, but opinion is divided as to whether this period should be preceded by agitation or not. Crucible melting permits of this quiescent period to a high degree, and electric furnace melting is almost as satisfactory, but the same cannot be said of the other processes. In general, the methods of melting best calculated to allow the breaking up of emulsion produce the cleanest steel.

The author quoted quite liberally from the eminent colloid chemist, Prof. W. D. Bancroft, of Cornell University. He concluded by saying that there are doubtless various paths leading to clean steel, but only one of these, a final quiet period in electric or crucible furnaces, is so far in use. Until a systematic study is made of the methods which the colloid chemists can suggest, only the surface of the possibilities has been scratched. No stone should be left unturned in the effort to produce clean, dependable steel for use where safety to lives is involved, and where requirements of lightness make it desirable to use a low factor of safety. To find such methods, the Bureau of Mines has planned a fairly definite program, but its funds at present do not permit this investigation to proceed with thoroughness.

Prof. Albert Sauveur, Harvard University, termed the subject brought up by his paper a most important one, but he did not consider it a question of colloid chemistry. He called attention to the reference that, when steel is tested in the direction in which it is worked, the physical results are radically different from tests taken at right angles to the direction of work, as in transverse tests. In his opinion the presence

of inclusions has some effect upon the results, but he believed that dendritic segregation is certainly a cause which has an effect even when inclusions are absent.

Last Work of Dr. Henry M. Howe

A paper which represents the last work of the late Dr. Henry M. Howe, which he was unable to complete, entitled "The Influence of Temperature, Time and Rate of Cooling on Physical Properties of Carbon Steel," was presented by Francis B. Foley, metallurgist, United States Bureau of Mines, Mississippi Valley experiment station, Rolla, Mo., who completed the work together with Joseph Winlock, assistant metallurgist, Bureau of Mines, Philadelphia. The paper is a complete one of 47 printed pages, well illustrated with photomicrographs and charts. Only a brief idea of its contents is here possible. Steels of 0.34, 0.52 and 0.75 per cent carbon were subjected to various temperatures above the critical point, held for 10, 60 and 120 min., and cooled at various rates, after which their tensile properties, hardness and resistance to impact, were compared. The second part of the paper covered a 0.52 per cent carbon steel quenched in water from different temperatures above the critical point and drawn at a number of temperatures below A_c . The third part of the paper was devoted to the result of repeated heatings of the same steel, the specimens treated in round sections $\frac{1}{2}$ in. in diameter.

Commenting upon this paper, Prof. Sauveur stated that the physical properties of steel depend first upon the microstructure and second upon dendritic segregation. In his opinion the first of these has been thoroughly studied but the second was ignored.

Cooling Curves of Large Ingots

A fourth paper, not formally presented, was entitled "Heating and Cooling Curves of Large Ingots," by F. E. Bash, research engineer, Leeds & Northrop Co., Philadelphia. It deals with a test which was made on an ingot 45 in. in diameter to determine the rate at which heat penetrated and the length of time necessary to bring the whole mass to a forging heat. Temperatures were determined by inserting thermocouples in holes drilled in the end parallel with the axis. After heating to a forging temperature, the ingot was withdrawn from the furnace and allowed to cool in the air while cooling curves were determined. The test showed the difference in temperature between portions of the interior as compared with the temperature of the furnace gases. It also showed the length of time required to pass through the critical temperature range and the time required to reach a forging heat.

Silicon Steels

"Low Temperature Brittleness in Silicon Steels" was the title of a paper presented at the close of the Wednesday morning session, presided over by Dr. George K. Burgess, Bureau of Standards. The author was Norman B. Pilling, research department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He called attention to the practical limitations to the usefulness of silicon steels which follow from the hardness and brittleness which silicon imparts to iron, making iron alloys with more than 8 per cent silicon unusable except for castings. In thin sheets of commercial silicon steel, if the silicon exceeds 4.20 per cent the sheet is too brittle for satisfactory shaping by punching or shearing. The first part of the paper described some tests performed on a thin sheet of steel containing silicon 4.69, manganese 0.22 and carbon 0.075 per cent, which had been found unsuitable for stamping. A test in which the speed of bending of this steel varied between wide limits showed that the type of fracture does not change when the rate of bending is greatly increased but remains transcrystalline and that the tendency to fracture can be counteracted by slow bending.

It does not seem, says the author, that the brittleness of this high silicon steel is susceptible to permanent improvement by heat treatment, and modifying the rate of cooling to an extent sufficient to change the carbon from carbide to temper carbon or increasing the annealing temperature, which is normally 800 deg.

C., has no noticeable effect, other than that quenching seems to increase the brittleness. Reannealing at a range of temperatures between 625 and 815 deg C. had practically no effect.

The author summarized his experiments by saying that the brittleness of silicon steel is an inherent property of iron modified by the alloyed silicon; that commercial silicon steel becomes brittle when the silicon content exceeds 4.20 per cent; that temporary ductility may be obtained at temperatures slightly above atmospheric, the necessary temperature depending on the composition of the steel, and that brittleness is only slightly modified by heat treatment.

The Physics of Steel

Under the title "Continued Discussion on the Physics of Steel," William R. Webster, Philadelphia, brought before the institute a subject which was discussed by him at the meeting in February, 1922. In his absence it was presented by Prof. C. R. Hayward, Massachusetts Institute of Technology, Cambridge, Mass.

Assuming that the time is ripe for a renewal of the discussion on the physics of steel, the estimated ultimate strength of pure iron, and the increase in its strength by carbon, phosphorus and manganese, were stated and discussed. All of this can be considered as an introduction to the practical use that is now being made of such data in selecting the heats of steel best suited to give the required physical tests demanded in the finished rolled material. The chemical composition of a steel, of course, tells only a part of the story, as many other factors must be considered, and controlled as far as is possible. Many of these matters are now being standardized in practical every-day work by the general use of better heating furnaces and the control of temperatures by pyrometers instead of by the eye.

In most of the steel manufacturers' practical working tables used for grading steel, no attempt has been made, he says, to consider separately the effect of each element, but only the combined effects of carbon, phosphorus and manganese. Such tables are now generally based on the results of tension and bending tests of rolled steel of different weights and thickness that have complied with the standard specification on which they were rolled. The tables, however, tell only a part of the story and generally will apply only to the rolled material of the mill from which the test records were obtained. For this reason, every endeavor is made to standardize all of these working conditions as far as possible.

"We now need for permanent record some of these working tables in order to show just what advances have been made in the past 30 years, together with information as to how the data were arrived at, the necessary changes that have been made in the tables from time to time, and—most important of all—some details of the troubles manufacturers now have with their steel."

Mr. Webster's paper contained four illustrations which consist of curves coordinating the effects of increments in carbon and manganese on the tensile strength of basic open-hearth and acid Bessemer steels. Professor Sauveur expressed the opinion that there are many uncertain factors to be considered and stated that the ingots should really all be of the same size and undergo the same reduction to obtain reliable conclusions.

Foundry Pig Iron Specifications

Another subject not entirely new was introduced at this session, namely, the "Tentative Specifications for Foundry Pig Iron of the American Society of Testing Materials." This matter was introduced at this session to bring out further suggestions on a subject which was quite thoroughly discussed at the June, 1922, meeting of the testing society. It was presented in abstract by Dr. Richard Moldenke and those in attendance had a reprint of the tentative specifications for foundry pig iron from the records of the meeting last June. In this case also very little new information was added to what had already been brought out at Atlantic City last year. Doctor Moldenke presented

After a brief review of what had been done up to this time and concluded his presentation by making the following statement:

The subject of specifications for foundry pig iron has been brought up as the safe starting point in the metallurgical procedure of foundry operations, and it seems to point the way to the further development of safe points of continuity in the production of a number of special lines of castings. The requirements in the specifications for foundry pig iron will be seen to leave the foundryman absolutely free in the selection of what he wants, merely safeguarding the methods by which he may know what he gets, as well as protecting the furnaceman in his proper shipments. Similarly, any specifications for a special line of castings should be very definite in fixing the physical characteristics of the material covered, but liberal in the ways and means of producing them.

The discussion following Doctor Moldenke's presentation was participated in by not only Doctor Moldenke but Walter Wood, John Howe Hall and R. F. Harrington, Hunts-Spiller Mfg. Co., Boston. Mr. Harrington offered from his own experience some corroboration of some of the points which Doctor Moldenke has for some time advocated, namely, that in specifying the composition of the pig iron which it is desired to obtain, it is better to ask for a definite percentage rather than a range, or in other words, to demand a pig iron containing 2.50 per cent silicon rather than one ranging between 2.25 and 2.75. Mr. Harrington stated that they had found it possible to obtain from producers a pig iron closely approximating 2.50 per cent by such procedure and that by so doing they had secured an iron which more nearly met their needs.

Doctor Moldenke stated also that in the matter of car wheels, it had been found by experience that it was practically impossible to specify both the physical and chemical requirements and that British users of iron were gradually coming to the conclusion that it was better to designate the percentage of one or two elements than to insist upon a more elaborate specification.

To a question of formulating a specification, which should include iron for steel foundry consumers, brought up by Mr. Hall, who again called attention to the fact that these specifications do not cover such iron, Doctor Moldenke replied that this matter is being considered by the committee, which now includes in its membership certain representatives of the steel foundry interests.

Session Devoted to Coke

The forms of sulphur in coke, the combustion of blast furnace cokes, coke ovens and the use of magnetic ore in blast furnaces were discussed at a joint session on iron and steel and coal and coke, at which C. A. Meissner, United States Steel Corporation, 71 Broadway, New York, presided.

Sulphur in Coke and the Blast Furnace

"The problem of sulphur in iron smelting will become of increasing importance as the higher sulphur coke is used, because of the rapidly diminishing supply of low sulphur coals," said Alfred R. Powell, associate chemist Pittsburgh Experiment Station, U. S. Bureau of Mines. Mr. Powell's paper was on the "Forms of Sulphur in Coke and Their Relations to Blast Furnace Reactions." Coke contains four characteristic sulphur constituents, he said: ferrous sulphide adsorbed free sulphur, sulphates and sulphur held in solid solution in the carbon. Reactions of the sulphur forms of coke in the blast furnace must be discussed largely from theoretical considerations, he emphasized, because no actual study has been made of coke, iron and slag from different zones of the blast furnace.

When the coke goes through the blast furnace with the remainder of the charge, the sulphur, said the author, undergoes several reactions. In the reduction zone the free sulphur and the sulphates are reduced to ferrous sulphide. In the zone of spongy iron considerable sulphur is taken up by the iron from the coke. The ferrous sulphide of the coke gives up sulphur at this point. Removal of this ferrous sulphide from the coke, or its conversion into calcium sulphide by liming the

coke, largely eliminates this absorption of sulphur. In the zone of preliminary slag formation, the absorption of sulphur by the iron is largely prevented. In the combustion zone the sulphur released from the coke is probably entirely absorbed by the slag. In this region the slag also removes from the iron the excess sulphur, which entered the iron in the spongy-iron zone.

A further study of actual spongy iron, coke and the lime or slag from different zones of the furnace was stated to be necessary to check the laboratory experiments. "Further experiments on a large scale, using coke from which the ferrous sulphide form had been removed, will be of special interest," said Mr. Powell, the action of lime in intimate contact with the coke in preventing contamination of the iron by sulphur being also emphasized as significant and worthy of further investigation on a large scale.

Combustion of Blast Furnace Cokes

The results of tests made to determine the relative combustibility of four kinds of blast furnace coke, with a description of the method used, was given by Ralph A. Sherman, assistant physicist U. S. Bureau of Mines. The paper, prepared jointly by Mr. Sherman and John Blizzard, fuel engineer of the Bureau of Mines, Pittsburgh, was entitled "Combustion of Blast Furnace Cokes in Fuel Beds." Lantern slides were used to illustrate the equipment employed in the tests, and graphs of the data collected. The investigation of the process of combustion in fuel beds of blast furnace cokes was said to show: That the rate of combustion, within wide limits, has no great effect on the final products of combustion, and that the relative mean combustibilities of the various cokes are different in different parts of the fuel bed. The mean combustibilities of the cokes tested for the entire fuel bed, calculated from the stack gases, when burned at a rate of approximately 25 lb. per sq. ft. per hr., were stated to be, in percentage: Clairton underheated, 77; Clairton overheated, 76; St. Louis, 77, and Benham, 73.

"The Combustion of Coke in the Blast Furnace Hearth" was a paper by G. St. J. Perrott, physical chemist, and S. P. Kinney, assistant metallurgical chemist Southern experiment station, Bureau of Mines, Tuscaloosa, Ala. The results of experiments made at 11 blast furnaces were given, the data having been secured at six furnaces in the Birmingham district and five in the northern.

The combustion zone of these furnaces, which operate on cokes, varying widely in physical characteristics, has been explored by means of water-cooled gas sampling tubes driven with the hearth through the tuyeres. The results were said to show that combustion of coke by the blast is complete 32 to 40 in. from the tuyeres. Little difference in the character of the combustion zone of the several furnaces is evident, and it was stated that it seems probable that large differences observed in blast furnace operation with different cokes are due to other factors than the relative combustibility of the cokes in the tuyere zone. Factors affecting coke combustibility and historical data as to the chemical reactions taking place in the blast furnace by analyzing the gas at different levels, are included in the paper.

Koppers and Roberts Coke Ovens

The method of heat generation and application in the Roberts coke-oven wall, and the apparent different results, were described by M. W. Ditto, Chicago, in a paper on the "Design and Operation of the Roberts Coke Oven." The description covered the recuperative type of oven in actual operation and the general operating results from the Illinois type of coal were given. Lantern slides were used to illustrate various features of construction. "Heat Distribution in the New Koppers Coke Oven," by Joseph Van Ackeren, superintendent Koppers Co., Pittsburgh, was read. The design of the Koppers oven and a study of the gas distribution were outlined and the cross-over flue principle in the new type of coke oven emphasized. The new oven was said to carbonize 27 tons of coal per 24 hr. as against 18 tons of the former design. The Roberts coke oven was described in THE IRON AGE of March 2, 1922, and

the new Koppers oven in the issue of Nov. 16, 1922. "Use of Magnetic Ore in the Blast Furnace," by G. P. Pilling, Philadelphia, was the other paper on the program for this session. It was fully abstracted in THE IRON AGE, Jan. 11, 1923.

Rock Drill Steel Problems

The third annual session of those interested in the problem of rock drill steel breakage and the heat treatment of drill steel was held Monday afternoon, Feb. 19, and was largely attended. Each year seems to add to the amount of interest taken in this subject and, while the progress is slow, considerable advance has been made. At the first meeting two years ago, an advisory committee to the originators of this study, who were connected with the bureaus of Mines and Standards, was appointed, and at the second conference at the convention of the institute a year ago a report of the workers in this field was discussed and it was agreed that the survey recommended should be undertaken, which should have for its object the ascertaining of the present status of the practice in the heat treatment of drill steels at the mines and the extent to which the breakage occurs.

Work During the Past Year

The meeting this year was devoted largely to a consideration of the report of what had been done in this matter during the past year. The report is based on a study of the progress reports made by Prof. Charles Y. Clayton, F. B. Foley and H. S. Burnholz, metallurgists at various stations of the Bureau of Mines and the Bureau of Standards.

The report is available in printed form and is quite lengthy. It relates the general impression received from the visit to 60 mines west of the Mississippi River, producing copper, iron, lead, zinc and other ores. The investigators state that they were struck with the lack of means for controlling temperature, without which the product in any heat-treating operation is bound to suffer. Of six companies which had tried pyrometry, five had discarded the equipment because the steels did not attain the temperature indicated by the pyrometer. In most of the mines the bits were quenched cold in water and not drawn before using. In 10 of the 60 mines, the practice in hardening was to quench from the sharpener without reheating. There was found to be far more variation in the heat-treating methods applied to the shank than to the bit of drill steel, and oils of many different kinds are used. As to detachable bits, it was found that two types are being experimented with, one attached to the shaft by a tapering joint, and the other attached by a thread or collar. In regard to breakage, it was found that in one mine, where good records were kept, about 6500 steels were broken and 2600 new steels were issued during the same year; therefore, more than 60 per cent of the broken steels continued in service in shorter lengths. The breakage was found to be 6.2 per cent of the drills sharpened for the year. This is said to be the average experience of mines where breakage records are kept.

Drill Steel Shanks

A paper, entitled "Hardness and Heat Treatment of Mining Drill Steel Shanks," by Prof. C. Y. Clayton, Missouri School of Mines, Rolla, Mo., was presented in abstract by the author. He stated that the hardness of mining drill shanks varies between No. 196 and No. 782 Brinell, the greater number of steel showing values between 364 and 444; that methods of heat treating vary not only between different mines, but also between different blacksmiths at the same property. The media used for quenching are water, oil and air, and the length of the shank treated varies between $\frac{1}{2}$ and 8 in. The author is convinced, as a result of his investigation, that a standard method of heat treating must be adopted by each shop if drill shanks are to give satisfactory service.

A New Heat-Treating Furnace

Mr. Foley, who presented an abstract of the report of the year's investigations, also described, by means

of lantern slides, a new heat-treating furnace for drill steel invented by George Gilman, of the Mead, Morrison Co., Boston. It is understood that only one installation of this furnace is now being used at a mine, but considerable interest was roused in its method of construction and operation and it was believed by many that in time it might become a valuable adjunct in helping to solve the drill steel problem in general. For the ensuing year it was decided to continue the investigations on the lines already established.

Institute of Metals

Undoubtedly a feature of the entire convention were the meetings of the Institute of Metals. The attendance at these was unusually large and enthusiastic. At the first session on Tuesday afternoon, Feb. 20, presided over by the president of this institute, William B. Price, there was in attendance a group of authorities on the subject of solid solutions which it is unusual to find together at one meeting. This subject was introduced by a paper entitled "Nature of Solid Solutions," by Edgar G. Bain, metallurgical engineer, National Lamp Works, General Electric Co., Cleveland. The presentation of this paper resulted in an animated discussion, participated in by Dr. Walter Rosenhain of England, Dr. Zay Jeffries, director of research, Aluminum Castings Co., Cleveland, Ohio, Ancel St. John, research laboratories, Carbide & Carbon Co., Long Island City, N. Y., and others.

Next Year's Lecture

Announcement was made that the annual lecture before the Institute of Metals, which this year was delivered by Dr. Walter Rosenhain, Monday afternoon, Feb. 19, will be delivered next year by Dr. Zay Jeffries. It was also expected that in the following year, February, 1925, another eminent foreign metallurgist will be brought over to deliver the annual address, which became a feature of these meetings last year when Dr. W. D. Bancroft, Cornell University, delivered the first lecture.

The Banquet and Excursion

The guest of honor at the annual banquet at the Waldorf-Astoria Hotel on Wednesday evening, Feb. 21, was Prince Gelasio Caetani, Italian ambassador to the United States. He recounted the manner in which he applied in war the mining knowledge he gained in America, his "second home," at Columbia University, of which he is a graduate. He referred particularly to the use he made of the Brunton compass during the war, when he directed the famous operations at the Col di Lana.

The dinner, which was largely attended, had as its toastmaster Cornelius F. Kelley, president Anaconda Copper Mining Co. The James Douglas medal, awarded annually for achievement in non-ferrous metallurgy, was bestowed on Frederick Laist, manager of the reduction plant of the Anaconda company; it was presented by Dr. A. R. Ledoux, chairman of the awarding committee. Other speakers at the dinner were the retiring president of the institute, Col. Arthur S. Dwight, and the new president, E. P. Mathewson, both of New York.

One of the most attractive features of the week's events was the excursion on Thursday, Feb. 22, to the largest plant of the American Brass Co., Ansonia, Conn., now owned by the Anaconda Copper Mining Co. About 400 members and guests went by special train. They were shown the production of copper and brass sheets and wire in the lower unit before noon. An elaborate luncheon was served at the city armory at which each one was presented with a souvenir spool of wire 0.002 in. in diameter, one mile long and weighing 1.023 oz., the smallest wire made by the company. In the upper unit, where the smaller sizes of wire and sheets are produced, a most interesting feature was the making of extruded products and "brass forgings" or hot-pressed shapes in a great variety. This is the first time that such an inspection has been permitted by any of the brass or copper companies in the famous Naugatuck Valley.

AUTOMATIC CONTROL APPARATUS

Regulates Temperature and Pressure—Economies Claimed—Safety Features

A new temperature and pressure controller, for use in connection with furnaces and boilers, which is claimed to save from 10 to 30 per cent in fuel oil, has been placed on the market by the Combustion Control Co., Otis Building, Philadelphia.

The illustration shows the apparatus as arranged for controlling supply of fuel oil, using air or steam for atomization. It is made up of two duplicate bodies

mounted on a common housing and each body has independent by-pass and auxiliary regulating valves. The housing also serves as a base for mounting a solenoid frame with its lever connections. The oil valve is shown at *A* and the steam or air valve at *B*. A shaft extending through the housing has the solenoid levers connected at the upper end, and an adjustable cross-bar, *C*, at the lower end. The cross bar carries and operates in unison auxiliary valves, which serve to regulate the fuel oil and air or steam for atomization. A hand wheel, *D*, for adjustment, and indicators and vernier for setting, are provided for the cross-bar. Steam or air for atomization has independent adjustment at *E*, *E*. The by-pass valves, *F* and *G*, are also mounted with cross-bars and provided with the hand wheel adjustment, indicator and vernier shown at *H*.

The steam regulating valve is of the balanced type and the oil regulating valve is provided with special angular porting to give close regulation and adjustment. The solenoids are wound for continuous service and are available for direct or alternating current of any voltage or cycle.

The operation of the device for temperature by pyrometric control is as follows: Assuming that 1500 deg. Fahr. is required in the furnaces, the by-pass valves are regulated to bring the heat up to about 1495 deg. and to maintain this temperature, which provides for radiation and vent losses and remains constant. The pyrometer controller is equipped with high and low contacts. After determining the heat losses, the switch for the current is closed and as the indicator of the pyrometer has been set to 1500 deg., low contact will be made. A circuit is then made through a two-coil relay and the solenoid is energized, which causes the core with its lever to rise and carry the shaft with the cross-bar and auxiliary valves upward, opening the valves and admitting additional fuel oil with steam or air for atomization.

As the cross-bar moves up, adjustment for fuel oil is made by the handwheel, *D*, and the proper amount of air or steam by the independent adjustment, *E*. The fuel thus added will bring the furnace temperature up until the pyrometer controller making contact at 1500 deg. will open the circuit which will de-energize the solenoid and cause the auxiliary valves to close.

The furnace temperature regulation being thus established, the load is placed in the furnace. Absorption of heat by the furnace load will cause a drop in the temperature, whereupon the pyrometer controller will make low contact, the auxiliary valves will open and more fuel will be added. The vernier provided for the valve cross-bar permits of determining the heating

time for various materials or loads, and instant settings to duplicate previous performance.

Safety features are provided. If through failure or loss of accuracy of the pyrometer the temperature desired is exceeded, the valve will close immediately to the point of the furnace temperature maintained. If the operating current should fail, the control will close to the same point. An emergency rest is provided for the solenoid lever so that hand regulation can be instantly made.

The apparatus is designed to operate in connection with any of the standard pyrometric controllers. For pressure control the same type of apparatus is used, but is operated from pressure regulation. It is available in six sizes from $\frac{1}{4}$ to $1\frac{1}{4}$ in. The $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ -in. sizes are mounted on one housing and all parts are interchangeable, the $\frac{3}{4}$, 1 and $1\frac{1}{4}$ -in. being similarly standardized. Attachments are available for the control of combustion air when furnace atmospheric conditions must be maintained. The apparatus is said to regulate

the temperature within the range of the pyrometer controller provided, which is approximately 3 deg. minus or plus.

Wisconsin Foundrymen Will Hold Meeting in April

MILWAUKEE, WIS., Feb. 26.—The first State-wide gathering of Wisconsin foundrymen and men engaged in other metal-working industries will be held in Madison on April 4 and 5.

At the request of the Wisconsin Foundrymen's Association, an organization of founders, managers, owners and executives, a State-wide "metals convention" will be held at the University of Wisconsin under the auspices of the department of mining and metallurgy of the College of Engineering.

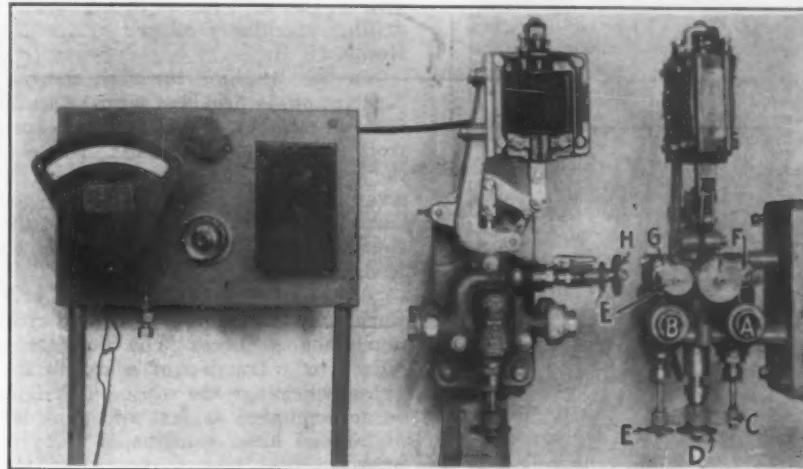
As there are 320 foundry groups and more than 700 different foundries in the State, the foundry men expect to have a large gathering at their first State convention.

An exhibit of foundry machinery and equipment will be held in the University Stock Pavilion during the convention. A program, including six technical sessions and visits to Madison manufactories and the Forest Products laboratory, is now being arranged.

The Society for Steel Treating, which includes members in Milwaukee, Chicago, Rockford, Moline, Minneapolis, Dubuque, and other cities, will hold a meeting at the university at the same time and will have a separate exhibit of steel-treating methods, appliances, and results.

The Wisconsin section of the American Institute of Mining and Metallurgical Engineers will also convene at the university.

Acting on advices received from Washington, the Bethlehem Shipbuilding Corporation, Ltd., has increased the working period of men employed on Government work at the company's Fore River Works, Quincy, Mass., to a six days a week basis. This is the first time since Aug. 1, 1921, that anything in the line of an increase in the working week has taken place at the Quincy plant.

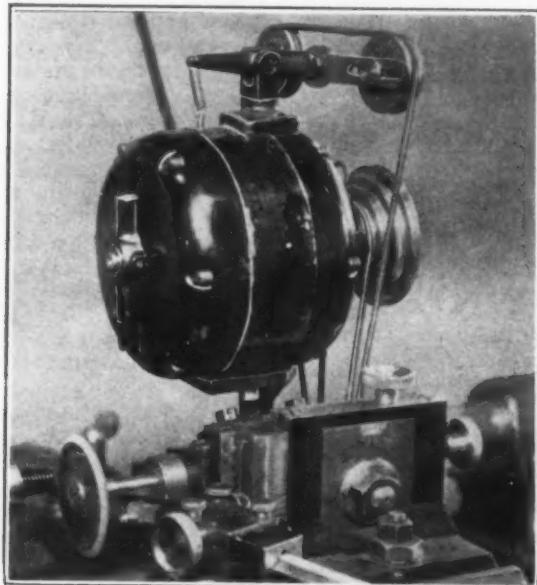


Automatic Temperature and Pressure Controller for Use With Furnaces and Boilers. The apparatus is shown as arranged for controlling fuel oil using air or steam for atomization

Improves Precision Grinder Attachment

A special fully inclosed, ball-bearing, statically and dynamically balanced $\frac{1}{4}$ hp. motor, intended to eliminate chattering, is among the improved features of the new multi-graduated precision grinder known as the 1923 model, recently placed on the market by the Precision & Thread Grinder Mfg. Co., Philadelphia.

The grinder spindle has been redesigned, the spindle and driving pulleys now being machined in one piece



Improved Multi-Graduated Precision Grinder. A special motor, statically and dynamically balanced, is employed and grinder spindle re-designed

from solid stock of heat-treated alloy steel. This change aims at preventing slippage due to loose pulleys. The rear bearing is designed so that should elongation of the spindle occur, due to increased temperature, it is subject to floating, eliminating extra duty on the bearings. The new spindle is heavier than that previously employed.

Ball bearings in the idler pulleys, and an improved index for setting the helix angle are also features. A dust cap has been provided on the grinder spindle to keep dust and grit from entering the spindle housing. Improved oiling devices have also been incorporated.

Improved Employment Conditions in Milwaukee

MILWAUKEE, WIS., Feb. 26.—Employment conditions in the iron, steel and machinery industry in Milwaukee continue to indicate gratifying improvement, according to the current issue of *Business and Financial Comment*, issued monthly by the First Wisconsin National Bank of Milwaukee. It says in brief:

"The net increase in the number employed by 48 of the largest firms in Milwaukee county from Dec. 28 to Jan. 30 was 2226, or 4.4 per cent. This result is surprising for the season of the year and is good evidence of the vigor of industrial expansion. The largest percentage of increase occurred in metals and metal products, automotive lines and iron and steel products. This gain was well distributed among the firms from which reports were received. A firm in the farm implement line took on about 200 additional men."

"Metal trade firms all show large increases in employment, unfilled orders and sales over January, 1922. One substantial steel foundry, for example, had 86 on its payroll in January, 1922, compared with 265 on Jan. 1, 1923. Its sales were 325 per cent and unfilled orders 600 per cent of January, 1922. A large company in the heavy machinery class had 765 in its employ in January last year and 1175 this year; sales were 163 per cent and unfilled orders 252 per cent

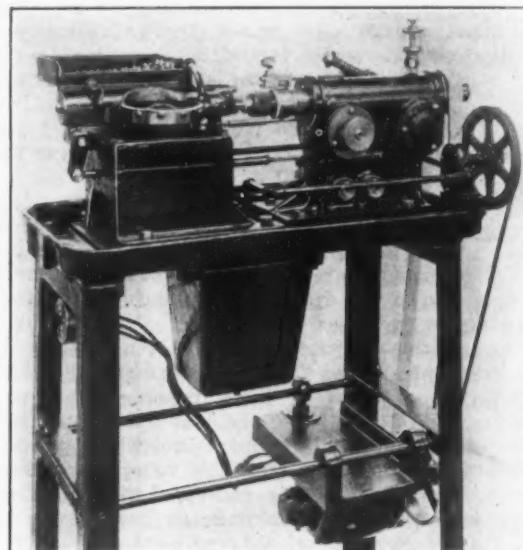
larger. A company manufacturing engines is operating at treble the capacity of a year ago, its orders are twice as large, and January sales show an increase of 75 per cent. Business in motor trucks appears to have made a substantial gain. One motor truck concern is operating at 88 per cent of capacity, compared with 44 per cent a year ago."

Machine for Cross Drilling Small Work

A machine combining its No. 8 automatic sensitive drill head, described in *THE IRON AGE* of Oct. 19, 1922, and an automatic indexing fixture designated as the No. 59, has been added to the line of special automatic drilling machinery offered by the Kingsbury Mfg. Co., Keene, N. H.

In this machine the dial, shown at the left in the illustration, is provided with 12 stations and is indexed from a cam cut on the friction cam wheel, which controls the feed of the drill. The machine will stop at the completion of each cycle before indexing, or the trip lever may be locked in its disengaged position and the machine will run full automatically. The control is similar to a power punch press equipped with dial feed.

The fixture is designed for cross drilling small work, such as binding posts and rivets, and also irregularly shaped pieces. The dial feed provided is said to reduce to a fraction of a second the time usually required to change the work. The drilling also is said to be accomplished as fast and more efficiently than on a high-speed hand machine, a feature attributed to the pressure feed system incorporated in the No. 8 drill head, previously described. The work is placed in a dial with stations shaped to suit it, and is automatically clamped in the drilling position. The clamping jaw is mounted on a substantial plunger and is held in



Automatic Drilling Machine for Cross Drilling Binding Posts, Rivets and Similar Work. The automatic indexing fixture is a feature

alignment through a hardened and ground pin. The work is clamped from the back under spring pressure.

Where the work will permit, it may be ejected from the dial beyond the drilling position, in which case it is said that the operator may easily keep the dial fed to produce at the rate of 35 pieces a minute, at a spindle speed of 4000 r.p.m. Only work with small short holes, particularly of brass, can be drilled at this rate however, but as the drilling time automatically adjusts itself to conditions, the operator does not have to occupy himself with feed adjustments.

The Sydney C. McLouth Foundry, Marine City, Mich., was completely destroyed by fire Feb. 21. This company recently started on a large production order of Ford pistons, and the plant is to be rebuilt at once.



Mill work desperately hot at times, but not too hard. An experienced man's views of "Steel" — Living far from Nature, with little time for home

BY ALDEN D. PERLEY



WHEN requested by *THE IRON AGE* to review the book, "Steel, the Diary of a Furnace Worker,"* by Charles Rumford Walker, I was pleased with the idea. I knew that Mr. Walker had been only a few months in the mills and that the book had been widely read. As we are both Yale men, I felt a friendly interest, but I have seen so many college men come and go from the mills without ever sensing the real spirit of them that I expected to find much to criticise. Also, I imagine, there always will be a pleasure to an "old hand" in pointing out the shortcomings of the new man.

When I read the book, however, I was both astonished and delighted with it. Probably those who have not been through the same experiences will miss some of the humor of the various situations he describes, but I believe every one will enjoy Mr. Walker's style. To me the book breathes of the mills and the men who run them. It gives both their thoughts and their language. It is a friendly, kindly view of conditions as he found them. Yet, I believe Mr. Walker has, as I have often done, gotten a lot of real pleasure out of this rough, hard work and from knowing the foreign-born workers as individuals.

Mr. Walker speaks of the seven-day week and the 24-hour "long turn" as the greatest evils of the mill. I think he rather leads one to believe he was working for the United States Steel Corporation, although his description of the open-hearth plant which he was in could apply to only one mill, that of a large independent in the Pittsburgh district. These facts may not seem related. I wish to make the point that I put in many 24-hour and 36-hour turns for an independent, but that in the six years I was with the Steel Corporation I never worked the long turn or saw it worked as part of regular routine except during the "big strike" of 1919. This may be, however, a difference between the Chicago and Pittsburgh districts. I also believe the "long turn" was worked very justly every place during the days most of us were in the army. I do know of a good many evasions of the six-day week rule, but whenever it became at all frequent, there was certainly a lot of "hell raised" from "above."

Other things to take in consideration in judging Mr. Walker's brief experience in the mill are that he was there in the summer time only, when both the work and the daytime sleeping are much harder on the men. He would find the same gang in much better shape in cool weather. Just a breath of cool air brings a thrill

and exhilaration to men coming out of heat. On the other hand, his work was on large tilting furnaces where the work is much cooler than on stationary furnaces. He missed entirely the care of a stationary furnace tap hole. This is, to my mind, next to cleaning out the flues on a blast furnace stove, the most punishing task in steel making, and it comes once or twice every day, instead of once or twice a month as on the other job. I might also mention here that work has been much speeded up in the mills since 1919—and much more is expected of a man. This is an effort to get back to the old "normal."

One who has never tried it can little realize how desperate some of the work in the heat is—heat so intense that the skin would burn instantly were it not wet with sweat; heat where I have seen a dry handkerchief tied across my face go up in a blaze; heat where one must stand his ground even when he smells his sweat-wet trousers scorching.

Yet I maintain the work in the mill is not too hard.

It does not drag men down in moderate weather. Men really enjoy punishment, or else why do they play football, run races, or engage in prize fights? I have often gone through all the stages of exhaustion, becoming so weak it seemed I could offer the company no more, no matter how willing, but always think of the back stretch in the last lap of the mile run. I take the same pleasure in seeing Wasco or Steve or Mike give in that I used to take in seeing a rival break in foot race. In normal weather a worker is sure to get his strength back in a day or two. It is generally real manly competition; and how you get to know yourself in those long workouts!

In the summer I admit hot work is desperate work oftentimes. It wears and frazzles out the best of men. But I disagree with Mr. Walker that there is in steel making the grind of monotony of the building of pyramids or of working in the cotton mills. Every day is different. There is a trial, a daily work-out of both patience and physique, that I often crave. There are "hell raisin'" moments that blow the best-controlled tempers to smithereens. The mill is the one place where a man is allowed to exercise a temper and keep his friends. There is an absorbingly interesting metallurgical study on a gigantic scale—something so much more satisfying than studying soaps or perfumes or peering through a microscope. At least so it seems to me.

But, as Mr. Walker says, the big trouble is there is no time at home. By the time the worker goes back

*Published by the Atlantic Monthly Press, Boston. Price \$1.25.

and forth there is not time enough left for sleep. Mr. Walker's plant was easy to get in and out of, taking him only 20 minutes. In some plants it takes that long to get to the gate and then men are drawn from a radius of ten miles. I never could understand why they legislated out of business the "jitney bus" that saved the average man 30 minutes a day at home. It was used winter and summer in preference to street cars. I also never understood why special-licensed jitneys did not come inside the gates to each separate department's loading stand and enter and leave by special gates. It always seemed to me that many of the officers of big companies thought hard, but only along certain lines, the ruts into which they had fallen, for even our best plants are still crude with vast room for improvement, especially in details—details that generally only the laboring man sees and never is thanked for mentioning.

At present there are three to five foreign men single to every one that is married. Their homes are gen-

erally large boarding houses. Surely the ideal condition for the future is to expect each man to have a wife, a family, a house. Our foreign sections should spread out to allow each family a home, a garden and chickens. We should be planning for such towns in the future. Eight hours at the mill would allow some time for work at the home and help keep down the cost of living. It is true that the extra four hours are not worth so much to the boarder, but we must work toward the ideal. Even today we can do much to help the men get in and out of the mill more quickly and to get farther out of town to live.

To my mind the workingman's case is not the one of "No can live" of which Mr. Walker speaks, but of a "helluva way" to live, this artificial life, so far from nature. It is a life of tenements, of a few common property women, of drinking, of long hours of night and day work. There is little incentive to accomplishment where there is no home, no children to grow up, nothing but the same old long-houred job.

COST OF LIVING NO HIGHER

Foods and Farm Products Decrease in January—All Other Items Increase—Total Advance, 13 Per Cent in Year

Wholesale prices in January averaged just the same as in December and November, according to the information gathered by the Bureau of Labor Statistics, but were 13 per cent higher than in January, 1922.

Metals and metal products, as a group, advanced 1½ per cent during the month, and reached a point 18.8 per cent higher than a year ago. THE IRON AGE composite price for pig iron, at mid-January, was 44 per cent higher than a year ago, and the composite for finished steel was 20 per cent higher than in January, 1922.

Metals stand liquidated 68 per cent of the 1920 peak price excess over 1913—that is, 68 per cent of that excess has been wiped out. This liquidation, a year ago, had reached 87.5 per cent, a portion of which has since been lost by price advances in nearly all items. "All commodities" have been liquidated 62 per cent, on the basis of the January figures; a year ago, it was 74 per cent.

Index Numbers of Wholesale Prices, by Groups of Commodities (1913 equals 100)				
	1920 Peak	1922 Jan.	1922 Dec.	1923 Jan.
				Advance in One Year, Per Cent
Farm products.....	247	122	145	143 17.2
Food, etc.....	248	131	144	141 7.6
Cloths and clothing.....	346	176	194	196 11.4
Fuels and lighting.....	281	195	216	218 11.8
Metals and metal products.....	203	112	131	133 18.8
Building materials.....	300	157	185	188 29.7
Chemicals and drugs.....	213	124	130	131 5.6
House-furnishing goods.....	275	178	182	184 3.3
Miscellaneous.....	208	117	122	124 6.0
All commodities.....	247	138	156	156 13.0

Figures of the National Industrial Conference Board, New York, show the January cost of living at 58.1 per cent above the figure for July, 1914. This is a slight reduction from the 58.9 per cent excess in December. The only items showing change were food, which decreased 2 per cent during the month, and clothing, which increased 2.2 per cent. The figure has shown slight variation over the past year, the highest of the twelve months being the December figure, while the lowest was 54.5 per cent in August.

Temple Furnace to Be Blown In This Month

Temple furnace at Temple, Pa., will probably be blown in March 20, according to present plans. S. Valentine, Oxford, Pa., is to be superintendent, with Frank Le Claire, of Port Henry, N. Y., as his assistant. Improvements made recently include a new hearth jacket with complete new bosh, new stack lining and modern equipment at the top; a new pig breaker elevator and building; a new 50-ton Howe track scale and new roofs on the cast house and other buildings.

MORE WORKERS BUT LOWER PAY

Increasing Employment in Identical Shops Accompanied by a Decrease in Average Wages

WASHINGTON, Feb. 21.—Bureau of Labor Statistics figures for January cover 4153 establishments in 43 manufacturing industries and involve 1,839,678 employees whose weekly payroll amounted to \$45,107,280. Compared with December, there was an increase of 1.4 per cent in number of workers, but a decrease of 2.8 per cent in the total wage payments, connoting a decline of 4.07 per cent (from \$25.56 to \$24.52) in the average pay envelope.

Figures for the principal metal working industry follow, with comparisons between January, 1923, and the preceding month and the same month one year ago.

Periods	Number of Establishments	Number of Men	Week's Payroll	Average Pay Envelope
<i>Iron and Steel</i>				
Dec., 1922...	184	216,788	\$6,064,831	\$27.98
Jan., 1923...	184	219,954	6,015,093	27.35
Jan., 1922...	110	109,708	2,054,756	18.73
<i>Automobiles</i>				
Dec., 1922...	126	223,601	7,013,152	31.37
Jan., 1923...	126	233,063	6,573,018	28.20
Jan., 1922...	39	84,418	1,475,644	17.48
<i>Car Building and Repairing</i>				
Dec., 1922...	85	97,775	2,710,346	27.72
Jan., 1923...	85	99,644	2,607,792	26.17
Jan., 1922...	55	41,125	990,899	24.10
<i>Foundry and Machine Shops</i>				
Dec., 1922...	237	100,617	2,862,210	28.45
Jan., 1923...	237	102,937	2,828,005	27.47
Jan., 1922...	(not reported)			
<i>Metal Workers</i>				
(the four groups above)				
Dec., 1922...	632	638,781	18,650,539	29.20
Jan., 1923...	632	655,598	18,023,908	27.49
Jan., 1922...	204	235,251	4,521,299	19.22

*As present reports cover many more plants, the January, 1922, figures are of interest only as indicating changes in wage rates.

†Foundry and machine shops not included.

Acme Steel Goods Co. to Expand

The Acme Steel Goods Co., Chicago, is constructing an addition to its plant at Riverdale on the Calumet River, consisting of two cold-rolling mills, 80 x 580 ft., and 100 x 480 ft., respectively, and a warehouse, 75 x 350 ft. The buildings will be finished during the spring and summer, and will add 250 men to the company's payroll. Between 500 and 600 men are now employed.

The Worthington Pump & Machinery Corporation reports net income of \$879,685 for the year ended Dec. 31, 1922, after allowing interest, depreciation and taxes. This compares with a net loss of \$188,630 in 1921. After paying dividends on preferred A and B stock, there is shown a deficit of \$131,113. The final deficit in the previous year, after paying dividends on all stock, amounted to \$1,849,035. The present total surplus is \$2,385,741.

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American Machinery Handicapped

American machinery builders are bound to feel the effect of the workings of German liquidation of reparations, particularly in any expectation of business with France or Germany. In a large percentage of cases the purchase of German-made machines is compelled. Many French and Belgian users of machine tools and other machinery equipment would much rather have American models, but expediency if not regulations require buying without compelling any drawing on working capital. The buyer then merely reduces the amount of his claim for reparation.

The practice applies only to replacements due to the destruction or removal of machinery by the Germans during the war, but naturally this comprises the great bulk of present day business, in the process of rehabilitating industry. When machinery other than this is to be purchased, the buyer must use his own capital and the business is along the usual competitive lines. Though the American builder is compelled to charge more, the superiority of product wins many orders, particularly for precision and automatic machinery.

Complaints are heard that some German firms are using French and Belgian customers whose business is obtained through the channels of reparation for testing out new models of machine tools. Such is the word brought to the United States by visiting representatives of European agents, and by Americans who have been studying the situation abroad at first hand. They assert that it is a well-recognized fact that the first lot of a machine which is new to a German builder is furnished on reparation orders, unless strong objection is made, and every machinery man knows that the first machines of any new model are seldom satisfactory when compared with those that come afterward, when weaknesses of design and construction which develop in initial tests under production conditions have been eliminated. Oftentimes the maintenance of the unperfected tools is costly and they are idle many days while changes or repairs are being made.

Since the war German machinery builders have been pirating some of the best American machines on a large scale, according to authoritative re-

port. It is an accepted fact that, no matter how careful the attempt to copy a high grade machine may be, the result must be no more than an imitation until the machine has been given those refinements which only practical experience can discover. Exact measurement of parts and analyses of materials are not in themselves sufficient. There seems to be no doubt than in French and Belgian shops many such machines are operating under what may be termed experimental conditions, with results in the way of production in no way comparable with the originals from which they were pirated.

The French or Belgian customer is not always in a position to choose, apparently, in these times when he is rebuilding his plant and his business. Under the reparation system, he is at a disadvantage, while the German manufacturer who supplies him is at a correspondingly great advantage, for the time being. Imitation models are working side by side with the American originals, which is not at all good advertising for the Germans, and must serve as good publicity for the machinery builders of the United States.

Steel Production and Capacity

Since the war the steel ingot producing capacity of the United States has been somewhere between 50,000,000 and 55,000,000 tons a year. No estimate of any weight that has been made falls outside these limits, and the precise figures most commonly mentioned are 52,000,000 and 52,500,000 tons, not that a precise estimate can be made, but that a precise figure is necessary in order to compute or estimate the percentage rate at which the industry operates.

It has been remarked that before the war the steel industry almost invariably operated at "capacity" when it had a sufficiency of orders, and that at no time since 1916 has it been able to do so, although frequently well filled with orders. Regret has been expressed that the steel industry has been unable lately to "function" as it used to do. Such regret is natural enough, but perhaps the viewpoint is not precisely the right one.

The fact really seems to be that steel suffers

by a comparison with a reputation built up under peculiar circumstances. It is not established that an industry must be able to operate at its capacity any time it is called upon. Difficulties are encountered, and the steel industry should not be expected to do what other industries are not expected to do. During the first nine months of 1920, when there was heavy market demand for steel, the industry operated at an average of 80 per cent of capacity, taking capacity at 52,500,000 tons for the purpose of computation. From April 1 to Oct. 1 of last year, feeling the influence of the coal strike, the industry operated at about 65 per cent of capacity.

These are low percentages for steel, from the viewpoint commonly taken, but they would be high rates for some other industries. There is the coal industry, for instance, which it is said could supply all demands by operating at two-thirds of its "capacity," but the capacity is based on eight hours in a day while the steel industry takes every minute of the 24 hours.

As to the alleged showing of capacity operations the steel industry made before the war, some question may be raised. Improvements were being made at a rapid rate and processes were being changed. A productive unit when installed did not at once attain its best tonnage. It was the habit of steel mills to break their previous records at frequent intervals. Tardily, rather than in advance, capacity ratings were moved up, and the system made it easy for a single plant, or the whole industry, to operate at "capacity." One unit, forging ahead, made up for another unit that temporarily fell back.

Conditions in the past six years have been different. While the effort to make tonnage is not relaxed, the improvements are more largely along the line of effecting economies in labor and materials. The steel industry does not need additional tonnage capacity now but, like every other industry, it needs to make the best product possible as cheaply as possible.

Another point to be considered before unfavorable comparisons are made between operating rates now and before the war is that, while in general low production costs go with large tonnage outputs, it is output per individual unit that counts in reducing cost, not output attained by operating inefficient and high cost units. There are many steel companies whose lowest unit cost is attained by operating 80, 85 or 90 per cent of the total "capacity" rather than 100 per cent.

The Pacific Coast has over 10½ per cent or 43 of the 406 electric steel furnaces contracted for or installed in the United States on Jan. 1. From these furnaces almost every possible product is being produced, not only steel castings, including alloy, but various kinds of iron castings as well. Ingots, both plain carbon and alloy, are regular products. In one plant, two furnaces, one acid and one basic, are producing carbon and alloy steel castings, gray and white iron castings and special alloy ingots. The predominance of the acid bottom is noteworthy, insuring a high grade product in the shortest time. The situation is a

good illustration of the flexibility of the electric furnace and its adaptability in a region of high cost pig iron and coal.

Foremen's Safety Meetings

Foremen's meetings which are being held all over the country under the direction of the National Safety Council and its local branches are doing a vast good, according to manufacturers whose own men have had the advantages of the teachings and their stimulus.

In industrial cities, large audiences composed of foremen, subforemen and young men who are being trained for minor executive positions listen to wise counsel and afterward enter into a general discussion of the particular subject in hand. These are the men, it is now generally agreed, upon whom, more than upon any other element of industrial control, rests the active responsibility of industrial hazard, and also the general physical health of the workers.

Many of the large manufacturing corporations have long realized this fact and have fostered privately the education of foremen and other lesser executives as to these duties. A striking example of this is the American Steel & Wire Co., which for years has carried on persistently a system of foremen's conferences and inspections. In these the department of each foreman in turn is subjected to the scrutiny and criticism of his fellow foremen. The psychological effect of the practice is easily recognized.

The subject is not a new one, but new interest has been created by the National Safety Council's sustained drive. Because of these foremen's meetings the accident rate, it is firmly believed, has dwindled and with it liability insurance premiums. At a recent foremen's meeting, it was brought out that while 19 per cent of accidents in an average manufacturing department were due to machinery, 28 per cent resulted in the handling of material. Machinery accidents have been reduced tremendously by protection, yet men can get hurt through their own heedlessness, and also through ignorance which the foreman has failed to remove by sufficiently painstaking instruction. In the handling of material, especially where it is heavy, there is a wrong way and a right way, and the foreman's duty is to see that the wrong way disappears from his department.

The liability insurance companies which underwrite workmen's compensation find wide variations between departments of similar equipment and product. One, for instance, may have no cases of septic poisoning, while others have altogether too many, and oftentimes the investigator puts his finger on the heedless foreman as the responsible party. He had failed to exercise his authority in ordering that injuries be attended to properly, particularly the minor injuries.

At the meetings foremen are urged to have frequent talks with their people, individually and in groups. To cite again the American Steel & Wire systems, each department at intervals is shut down during working hours, while the foreman, or occasionally some one who specializes in health

and safety, talks to the men, hammering in the need of due care in this or that respect. It is impressive to the average employee to see machinery standing idle and his pay going on, while he is instructed how to take care of himself. It must be important indeed, he thinks, if the company will stop production to teach the lesson.

Perhaps nowadays it is the small plant which, most of all, needs the system. It cannot afford to maintain specialists on safety. In very many cases owners have given the subject little thought, excepting where they have been spurred on by the liability insurance companies. Interest once aroused, the conversion from a poor accident risk to a good one is likely to be a quick one.

Pig Iron and Steel Production

In the latter part of the coal strike last summer it was noticeable that the production of steel was not restricted so much as was the production of pig iron, while on the other hand November and December witnessed increases in pig iron production that had no counterpart in steel. There was a substantially unchanged rate of steel ingot production during the last three months of 1922, whereas production of pig iron by the steel companies, as shown by THE IRON AGE monthly blast furnace reports, underwent sharp increases.

What occurred, of course, was that when the coal strike made coke extremely scarce the steel works drew upon their reserves of pig iron, and in the last two months of the year these normal stocks were replenished. The steel interests were moved to restore their reserves promptly, as there was danger of another coal strike this year. In January the strike threat no longer prevailed, and production of steel resumed a natural relation with the production of pig iron. There was an increase in both from December to January, but the increase in steel production was the greater.

The relation between pig iron production and steel production is of broader importance than the mere matter of exhausting and replenishing steel works reserves of pig iron. The tendency year by year is to use more scrap in pig iron, because supplies of scrap increase relative to the current production of steel. A study of this point can be made, by comparing the production of pig iron by the steel companies as reported monthly by THE IRON AGE and the production of steel ingots by 30 companies as reported monthly by the American Iron and Steel Institute. The subject matter is not precisely the same, since a small part of the ingot tonnage reported to the institute may be made from purchased pig iron, but the comparison cannot be materially distorted.

The total ingots reported by the 30 companies for the three years 1920, 1921 and 1922 amounted to 31 per cent more than the pig iron reported for all steel companies in the period. Taking this ratio as basis, or 100, the following relatives are shown, indicating the amount by which ingot production exceeded or fell short of the normal or average relation to pig iron in the three-year period:

1920, 99; 1921, 95; 1922, 105; August, 1922,

119; September, 112; October, 107; November, 102; December, 91; January, 1923, 100.

The relatives show very clearly that the steel companies made much more steel last August than would be expected from their pig iron production in the month and that, on the other hand, they made much more pig iron in December than they needed for their steel production in that month. In January the balance was restored, and according to the figures it was restored precisely.

In the difference between the relatives for 1920 and 1922 there is a suggestion that will bear watching. There was more steel relative to pig iron made in 1922 than in 1920. In view of the large amount of scrap left from the war-time activities, one would be inclined to expect an opposite showing, that there was an abnormally large scrap supply in 1920, and only a normal supply in 1922. There is a strong hint in the figures that there is a natural and progressive increase in the proportion of scrap available. Year by year we make a larger proportion of our steel by reworking old material and industrial scrap and a smaller proportion by taking virgin material from the ground.

Road making promises to take considerable steel this year. Concrete paving will be laid to the extent of about 9000 to 10,000 miles this year, if this kind of road construction is continued at the rate shown in the past several years. About 25 tons of reinforcing bars are needed per mile for the type of road now well regarded. If one-half of the concrete paving should be the heavily reinforced, it appears that 1923 will consume over 100,000 tons of concrete bars for roads alone.

CORRESPONDENCE

Suiting Galvanizing to Conditions of Use

To the Editor: We have read with great interest the comments of the Inland Steel Co. through its special representative, Frank A. Weidman, which appeared in your Jan. 4 issue. Our conclusions regarding modern galvanizing were not formed so much on the basis of the examination of the samples in question as they were from the opinions gathered from a large volume of correspondence and conversation with the various sources enumerated in the second paragraph of our article.

In answer to Mr. Weidman's well taken points regarding the samples of galvanized sheets, the 50 samples in question were all No. 26 gage. The sheets from which the samples were taken were purchased as the regular commercial output of the various manufacturers, and of these 50 samples only six were reported as tight coated; of these six, four were coated in a lead and zinc pot as indicated by the lead analysis of the coatings. About one-third of the sheets were corrugated and the other two-thirds were flat, with no appreciable differences in the weights of coatings. It was distinctly our purpose in gathering these samples to secure the average material furnished to consumers who were purchasing without specification, and thus to check up the complaint which seemed so widespread. Our investigation extended to other gages as well. For example, our samples of No. 22 gage, which is largely used for roofing and siding, do not show zinc coatings appreciably in excess of that found on the No. 26 gage.

We said: "Another reason for reducing the weight

of the coating is to enable the severe bending and forming operations, to which some galvanized iron is subjected, to take place without flaking of the coat." We think Mr. Weldman confirms our findings in this respect when he speaks of the recent railroad specifications showing considerable liberality with regard to the weight of coating, inasmuch as these same railroad specifications are specifically directed to flat galvanized sheets and contain a severe bending test.

Mr. Weidman's letter gives the impression that all galvanized iron sheets find their ultimate use in some fabricating plant, and therefore the reduced weight of coating. We wish to point out that there is a very large tonnage of corrugated galvanized iron sheets, which is subject to no severe fabrication. Would any iron or steel manufacturer furnish the same kind of finished steel stock for deep drawing operations and for the manufacture of springs? And yet is he not forcing the average buyer of galvanized sheets to take what the sheet mills' fabricating customer insists on having for his particular purpose?

Does not the difficulty with the manufacturer lie in the fact that the fabricating customer's trouble with flaking of the present day heavy coated sheets is apparent immediately when he starts to form the material, whereas the average consumer who is not subjecting the material to severe bending does not begin to get his answer from actual exposures until two or three years have passed by? Is there not an attempt to make one galvanized product for every purpose, when there should be several grades each specifically suited, with respect to the coating, for its intended use?

We still feel that we are working for the mutual interests of the iron and zinc industries in the re-establishment of the reputation of galvanized iron, and trust that there will be further discussion of this phase of the subject as well as of galvanized products other than sheets.

J. A. SINGMASTER,

General Manager Technical Department.

G. F. HALFACRE,

Investigator, Research Division.

New Jersey Zinc Co., New York.

JAPANESE STOCKS DECREASE

Prices Are Stronger and Less German Material Is Offered

TOKIO, JAPAN, Jan. 20.—Supplies of imported steel materials are rapidly diminishing, and a shortage is developing. Stocks of tin plates and thin steel plates are almost exhausted and prices for these are expected to improve. However, the Yawata Government Steel Works, which recently decreased its selling prices, still quotes bars at 97 yen per ton, which is lower than the present market price, and so the market for iron and steel materials in general is rather dull. The decrease of the selling prices of the Yawata steel works was due to the low quotations on German materials. The tonnage of German material remaining is rather small. The market is expected to continue unchanged for some time. On the Tokio market, round bars of $\frac{1}{2}$ in. diameter are quoted at 4.65 yen per 10 kamme (83.20 lb.), round iron bars from $\frac{3}{5}$ to $\frac{4}{5}$ in. diameter at 4.15 yen, square bars from 4.10 to 4.30 yen according to size, light steel plates at 5.60 yen, medium 6.30 yen and heavy plates at 6.40 yen.

Exports of Metal Working Machinery

On page 354 of THE IRON AGE for Feb. 1 is given a summary of the machine tool exports of the United States for November and December respectively. The Department of Commerce has now reported upon the destinations of the December shipments of four of the principal types of metal working machinery, lathes, milling machines, boring and drilling machinery and planers, shapers and slotters. The principal details of the report are covered in the appended table, which shows the total number and value under each heading

going to the principal quarters of the two hemispheres, as well as the amount going to the leading purchasers under each of the grouped headings.

Receiver's Sale of Equipment at National Conduit & Cable Co.

Equipment and material in the buildings of the North Brass Plant of the National Conduit & Cable Co., Hastings-on-the-Hudson, N. Y., will be sold at public auction by the receiver at 2 p. m., March 9, on the premises. The sale will be conducted by Joseph P. Day, auctioneer, 67 Liberty Street, New York. The sale includes 15 steel jib cranes; 23 Bullard turret lathes; 3-ton Pawling & Harnischfeger monorail hoist; 12 sheet rolling mills of various sizes with motors and accessories; 3 Torrington gang slitting machines with motors; 3 Torrington sheet slitting and 3 Torrington sheet straightening machines with motors; shears, saws, winches, grinders, sheet metal cutters, bearing boxes for sheet rolling mills, presses, crucible melting furnace, annealing furnace fronts and doors, wire drawers, chucking machines, saw beds, straighteners, buffing machines, blowers, drills, benches, machine and crane parts, belting, saw horses, tanks and office and dining room equipment.

A discount calculator in the form of a slide moving in a pasteboard envelope, giving the equivalent simple discounts for compound discounts, such as are applied to steel pipe, has been prepared for general distribution by the Republic Iron & Steel Co., Youngstown. For each base discount the resulting discount given such buyers as large jobbers, for example, is obtainable by direct reading on the chart.

Destination	Exports of Metal Working Machinery		No.	Value	No.	Value	No.	Value	No.	Value
	Lathes	Milling Machines								
Europe	34	\$29,959	27	\$21,538	60	\$50,702	8	\$19,871		
France	5	5,943	11	5,295	12	14,000	12	21,764	3	7,399
Poland	15	10,900	12				12	8,335	1	151
Spain	1	2,511					11	9,143	1	1,225
Great Britain	7	3,489	1	500			6	9,052	3	11,096
Other	6	7,116	3	1,743			19	2,409		
North America and West							108	20,980	4	3,791
Indies	47	30,517	15	3,679	67	11,364	2			
Canada	31	13,448	11	325	29	7,332	2			
Mexico	6	6,363	4	3,354	12	2,284				
Other	10	16,706			29	437	1			
South America	26	29,136			26	184	1	1,706		
Argentina	17	6,960			3	253				
Dutch Guiana	1	9,368								
Brazil	1	7,540								
Other	7	5,268								
Asia, Africa, Oceania	17	17,206	7	6,878	42	7,266	3	2,801		
Japan	10	15,177	3	2,028	20	5,754	2	1,625		
Other	7	2,029	4	4,850	22	1,512	1	1,176		
Total	124	\$106,818	49	\$32,095	239	\$79,386	16	\$28,169		

TO PUSH STANDARDIZATION

New Plan Approved for Financing the Work in Industry

A new plan for financing the industrial standardization work of the United States, which provides for membership dues on the basis of 1 cent per \$1,000 of gross receipts, has been formally approved by the executive committee of the American Engineering Standards Committee. And 20 of the most influential industrial executives of the country have accepted places on an advisory committee which will cooperate with the ways and means committee in the refinancing of the American Engineering Standards Committee.

In submitting the report of the ways and means committee, A. W. Whitney, chairman of that committee and of the A. E. S. C., announced a new class of members in the A. E. S. C., to be known as "sustaining members," and provides a special service to "sustaining members," including information bulletins on developments in standardization work in this country and in every other country where industrial standardization is in progress.

The newly created advisory committee of the A. E. S. C. includes the following men:

W. H. Barr, president National Founders' Association, Chicago.

A. W. Berresford, general manager Cutler-Hammer Co., Milwaukee.

William Butterworth, president Deers & Co., Moline, Ill.

John J. Carty, vice-president American Telephone & Telegraph Co., New York.

W. W. Coleman, president Bucyrus Co., South Milwaukee, Wis.

G. B. Cortelyou, president Consolidated Gas Co., New York.

J. K. Cullen, president Niles-Bement-Pond Co., New York.

J. E. Edgerton, president National Association of Manufacturers, New York.

John R. Freeman, consulting engineer, Providence, R. I.

Sidney J. Jennings, president U. S. Smelting, Refining & Mining Co., New York.

Dr. Charles L. Reese, chemical director E. I. duPont de Nemours & Co., Wilmington, Del.

E. W. Rice, Jr., honorary chairman of the board General Electric Co., Schenectady, N. Y.

Henry D. Sharpe, treasurer Brown & Sharpe Mfg. Co., Providence, R. I.

S. W. Stratton, president Massachusetts Institute of Technology, Cambridge, Mass.

Ernest T. Trigg, president John Lucas & Co., Philadelphia.

E. M. Herr, president Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

The American Engineering Standards Committee, which was organized in 1918, has heretofore been financed entirely by dues from nine technical societies and 17 national trade associations, which with seven departments of the Federal Government constitute its present membership. Annual deficits were cleared by contributions from individual corporations.

It is expected that the new plan of financing will provide an annual budget of \$50,000 for the standards committee. For firms which for any reason prefer to subscribe on the basis of capital, rather than gross annual receipts, the recommended basis is 1½ cents per \$1,000 of aggregate market value of the corporate securities of the firm.

The plan calls for the appointment of an engineer-translator who will provide translations of standards developed in foreign countries for the information service to sustaining members. The new information service will be an elaboration of the work which the A. E. S. C. has been carrying on in a small way, in calling to the attention of cooperating bodies and the technical press, the important developments in standardization work, foreign as well as American.

be distributed evenly and at the same rate for apprentices as for journeymen.

When an inquiry was received by the foundry it was necessary to determine approximate weights of castings, the direct labor costs, the percentage of labor establishment charges and haulage depreciation. By adding outward carriage, depreciation, interest on capital and profit, the sale price was arrived at.

It was explained that the system was for hand and not for machine molding. Several questions were asked at the conclusion of the lecture with regard to foundries which were partly machine and partly hand and the substance of Mr. Hill's answer was that two systems were necessary in such foundries. Certain charges did not vary in ratio to the horse power of the machine but it was necessary to work out the cost rate of horse-power when different powered machines were used. There must be a difference in overhead charges between hand and machine labor.

An interesting point was raised in relation to foundries working two or three days a week. The lecturer replied that as general establishment charges had to be met it was necessary that they should be covered by the short time worked. It might be necessary, in order to tempt orders, to modify the price, but the foundry owner should do it with his eyes open to the ultimate danger of financial loss. It might be advisable to grade heavy and light castings and also to include a molding laborer as a direct labor charge.

Will Build Slag Disposal Plant

The Standard Slag Co., Youngstown, has entered into an agreement with the Republic Iron & Steel Co. to erect a slag disposal plant on Youngstown property of the Republic company, to handle the slag output of its five Haselton blast furnaces. The plant will have a per diem capacity for reducing about 2500 tons of blast furnace slag, which will be crushed into materials suitable for road building, concrete construction, railway ballast, roof-making uses and the like.

The new plant will involve about \$250,000.

FOUNDRY COST FINDING

System Outlined at Meeting of Institution of British Foundrymen

Foundry cost finding, especially in small foundries, has been carried on in such a haphazard fashion that exceptional interest attached to a lecture which Peter Hill delivered to the Lancashire branch of the Institution of British Foundrymen on Feb. 3 at Manchester.

Besides dividing labor into two sections, direct and indirect, indirect labor was further divided into cupola labor, which included all labor engaged up to that point in foundry operations, and molding and coremaking. In small foundries it was advisable to regard the dressing of castings, he said, as indirect labor.

Materials should also be divided into directly and indirectly used materials. The former would include all materials actually consumed in the processes of molding and casting including not only metal but blacking, facing sand, etc. In the second group would be included small tools and equipment which would be used over and over again. The inward carriage of raw materials, in Mr. Hill's opinion, should be regarded as a direct labor charge, but as the outward charge varies and has no bearing on the cost of production no account must be taken of it.

In all foundries there were wasters and on the production report the cause of rejection should be stated and replacement castings should be charged as an indirect labor charge.

Furnace losses were not considered in the system outlined by Mr. Hill but in considering metal costs, recovery from gates, runners, etc., were taken into account. New patterns should not be considered as a revenue charge but should be dealt with separately. The whole system really amounted to itemization, so that the cost of coke and limestone per ton of castings, for example, could be calculated. It was possible to get low priced coke but lose on final production costs.

Indirect labor, which included work on the plant, cost more than direct labor. Overhead charges should

British Exports of Iron and Steel

Tonnage for 1922 Exceeded That for 1920 and Was Nearly Double the 1922 Export Movement of United States—Imports About One-Fourth as Great as Exports

WASHINGTON, Feb. 27.—Underlying soundness in the British iron and steel industry in January was to be seen in strong prices, sustained ordering enlarged parcels and outlets for a wide scale of production assured over several months, according to a report based on a cable from Commercial Attaché Walter S. Tower, London. The production of pig iron of all classes in

Leading foreign markets for British Iron and Steel during the year ended Dec. 31.

	1920	1921	1922
	Tons	Tons	Tons
Articles and countries			
Pig iron and ferroalloys	579,509	135,686	793,916
Sweden	19,219	1,562	15,558
Germany	24,484	3,464	54,974
Netherlands	31,178	5,015	11,282
Belgium	181,191	37,094	90,655
France	59,316	19,201	51,853
Italy	80,652	16,644	67,447
Japan	26,574	3,196	7,528
United States	72,558	13,155	378,318
British East Indies	14,241	10,809	18,442
Australia	1,127	1,248	8,441
Canada	3,689	1,128	31,557
Iron bars, rods, angles, shapes and sections	58,966	31,296	31,825
United States	482	92	96
British South Africa	5,526	2,435	2,353
British East Indies	19,692	9,081	8,252
Steel bars, rods, angles, shapes, and sections, exclusive of sheet bars, tinplate bars and special steels			
Norway	362,870	106,899	220,129
France	10,454	1,057	1,774
Japan	27,121	3,845	4,086
United States	24,270	5,194	12,476
British South Africa	1,373	468	2,316
British India	9,830	6,858	6,400
Australia	117,750	29,460	41,177
New Zealand	7,043	14,855	78,811
Hoops and strips	5,293	4,809	9,838
British East Indies	56,468	21,770	48,306
Galvanized sheets (flat and corrugated)	22,536	11,087	18,165
Dutch East Indies	410,784	211,603	513,225
Japan	18,124	5,611	15,206
Argentine Republic	29,477	13,951	7,358
British South Africa	50,214	27,884	68,436
British India	34,546	13,023	34,798
Australia	72,460	57,806	117,355
New Zealand	59,721	38,650	99,831
Canada	23,025	7,542	23,390
Black plates	6,485	1,057	14,828
Belgium	36,123	14,162	55,579
United States	3,713	1,192	7,071
Tim plates	353,058	226,440	448,907
Norway	12,761	5,008	17,231
Germany	1,874	233	18,468
Netherlands	21,598	20,541	30,052
Belgium	17,032	8,078	19,172
France	60,566	6,512	32,227
Japan	9,958	21,802	16,765
United States	625	862	2,936
Argentine Republic	1,148	3,147	17,777
British East Indies	51,559	40,014	51,312
Australia	47,336	18,296	37,806
Canada	957	3,126	41,895
All other plates, except armor and coated	198,831	128,015	80,599
All other sheets	138,462	48,660	169,325
Nails and tacks (other than wire nails), rivets and washers			
Wood screws	21,129	8,394	12,034
Bolts and nuts (including metal screws)	6,328	2,053	3,023
British South Africa	23,596	13,950	15,335
British East Indies	3,323	1,474	1,621
Australia	7,981	4,082	4,693
Anchors, grapnels, cables and chains	1,051	1,500	2,617
	30,999	15,131	11,175

January was 567,900 gross tons, an increase of 34,200 tons over December; the output of steel ingots and castings was 624,300 tons, a 14 per cent gain over December and a 4 per cent increase over November. At the close of January there were in operation 183 blast furnaces and 320 open-hearth furnaces, 14 blast furnaces and 77 open-hearth furnaces having been lighted during the month.

Great Britain's foreign trade in iron and steel advanced in January to 128,855 tons of imports and 353,389 tons of exports as against 114,011 tons and 340,823 tons in December, the report says. These figures compare very favorably with those of the past few years, when imports for the month of January were 88,727 tons in 1922, 157,843 tons in 1921, and 70,761 tons in 1920, and exports were 253,354 tons, 232,380 tons, and 257,158 tons, respectively.

Imports of iron and steel products for the year 1922 totaled 881,792 gross tons, showing a much less dependency upon foreign goods than in 1921 and 1920, when 1,640,024 tons and 1,107,598 tons were imported. A partial list of the countries supplying this material, as given in the accounts relating to trade and navigation of the United Kingdom for December, 1922, is shown in an accompanying table. It shows a striking decline in imports from the United States in 1921 and 1922 as compared with 1920.

The recovery made by the British steel industry in 1922 is manifest when the amounts of iron and steel shipped abroad during the past three years are considered—3,401,115 tons in 1922, 1,696,889 tons in 1921 and

Leading sources of British imports for the year ended Dec. 31.

	1920	1921	1922
	Tons	Tons	Tons
Articles and countries			
Forge and foundry pig iron	49,581	410,243	58,498
Sweden	17,661	38,521	9,505
United States	14,035	4,249	1,077
Acid pig iron	12,267	8,551	155
Sweden	11,565	8,456	155
Basic pig iron	152,461	255,030	95,073
Sweden	102	1,730	619
Belgium	78,053	146,644	64,356
France	51,235	67,203	14,489
United States	6,539		
Ferro-alloys	16,116	5,609	10,774
Sweden	2,270	1,891	2,414
United States	3,880	136	703
Steel blooms, billets, slabs, other than of special steel	251,202	171,997	170,926
Germany	37	6,627	10,729
Belgium	37,229	99,276	50,227
United States	146,168	4,170	70
Iron bars, rods, angles, shapes and sections	90,807	128,557	75,064
Sweden	12,773	4,807	6,644
Belgium	52,991	105,713	50,986
Sheet bars and tinplate bars	36,191	100,757	70,357
Germany	34	5,845	4,279
Steel girders, beams, joists and pillars	12,696	36,405	39,014
Germany	298	493	376
Belgium	8,198	24,573	25,343

3,251,225 tons in 1920. One of the outstanding features of British foreign sales in 1922 was the large shipment of pig iron to the United States, which became particularly heavy toward the latter part of the year. The British dominions overseas figure conspicuously as purchasers of British iron and steel.

The British markets for iron and steel products during the last three years, as stated in the official accounts of the United Kingdom, are given in part in an accompanying table.

Work has been started on the first high voltage porcelain insulator works to be built west of the Mississippi River, at Emeryville, Cal., near San Francisco, by the Westinghouse High Voltage Insulator Co., Derry, Pa., a subsidiary of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The plant will supply the demand for insulators in that district as well as in other sections of the West and in the Pacific Coast district. It is expected that this plant will be completed and ready for use in three months. It will have a floor area of approximately 60,000 sq. ft. Marsden H. Hunt, ceramic engineer, Westinghouse Electric & Mfg. Co., is superintendent of the new plant.

MARKET STEEL SCARCITY

Semi-finished Material Hard to Obtain in Valleys —Tin Plate Price Advancing

YOUNGSTOWN, Feb. 27.—Indicating scarcity of semi-finished steel is the fact that a district sheet roller, compelled to purchase additional supplies or curtail, has been forced to resort to the latter expedient, due to inability to make purchases of sheet bars. This interest did considerable shopping before commencing a program of curtailment. In the Valleys, all forms of semi-finished material are firm at \$40 minimum, with talk of a \$45 price applying on spot shipments.

The Steel Corporation is reported to have purchased all surplus tonnages of semi-finished steel for the first quarter, leaving the market bare of excess supplies, except those made available by occasional changes in schedules of rolling mills.

Valley steel makers have all the business they care to handle at present. One large sheet and tin plate interest has been keeping its forward commitments down in order to take advantage of any price advances which may materialize.

A maker of pig iron in this district has sold 5000 tons of standard basic at \$27 per ton, this price representing an advance of \$1 per ton.

Independent tin plate producers are forecasting a price ranging from \$5.10 to \$5.25 for second half business. Already sales of small lots for early delivery as

high as \$5.25 per base box are reported. This represents an advance of 50c. per box above the \$4.75 quotation now prevailing. Independents have never been satisfied with the \$4.75 quotation for this quarter, and some of the more influential interests hoped that the market would be established at \$5 minimum. Some claim they did not sell beyond the first quarter at the lower price, and will therefore be in position to benefit from any advances which may apply on tonnage beyond that date.

Black sheets range from 3.50c. to 3.60c. in the Valleys, with the higher price ruling on much business now being closed. Sheet makers say that business is being offered to them in large volume, and they are having little difficulty in filling their rolling schedules. Galvanized makers are holding for a 4.75c. minimum. On some recent sales as high as 3.75c. has been paid for black sheets wanted for prompt shipment. Blue annealed grades are still held at 2.75c.

On all finished lines the market is moving forward. Independent merchant steel bar makers are taking second quarters tonnages, the price being established at 2.25c. as a minimum. Plates are moving as high as 2.50c. on ordinary gages. Strips range from 3c. to 3.50c. for hot-rolled, the narrower sizes taking the higher quotation, while the cold strip price is from 4.75c. to 5c. on forward business. Much of the cold-rolled strip tonnage now going through the mills was booked, however, at 4.50c. Demand from the automobile industry has been accelerated the past two weeks, as builders are expanding their production schedules.

Receivers Are Appointed for Sharon Pressed Steel Co.—Employees Loyal

With large orders on their books, every effort will be made to continue operations at the plant in Sharon, Pa., of the Sharon Pressed Steel Co., which has been thrown into temporary financial difficulties by the financial straits of the Cleveland Discount Co., Cleveland. Total claims of the Discount company against the Sharon company aggregate \$2,400,000, including a mortgage for \$1,500,000 and notes for \$900,000. Receivers have been appointed.

The Discount company had been making advances on the steel company's payroll, but was obliged to suspend them when it was placed in receivership. This caused the Sharon company last week to announce postponement in its payroll for one week.

In the meantime, negotiations are being carried forward to refinance the company, in order that it may meet its current obligations. A. E. Swan, general manager, reports that the company has well-filled order books.

Employees are continuing at work, and have pledged their support pending solution of the company's financial problems.

Bessemer Gold Medal Awarded to Doctor Maw

The Bessemer gold medal of the Iron and Steel Institute (Great Britain) has this year been awarded to Dr. W. H. Maw, who has conducted for nearly 50 years the well known technical journal, *Engineering*. Notwithstanding that Doctor Maw is now 85 years of age, only a few months ago, as president of the Institution of Civil Engineers, he made a most valuable presidential address in which many special references were made to iron and steel. It is understood that this year's award was made on the proposal of Sir Robert A. Hadfield, himself a Bessemer medalist.

Doctor Maw has been a member of the Iron and Steel Institute (British) for 49 years. Doctor Maw has also devoted himself to astronomy and microscopy and was president of the Astronomical Society.

The Special Libraries Association, which is a national organization of business and special librarians in the country, will hold its fourteenth annual convention in Atlantic City, May 22 to 25, at the Hotel Chelsea.

Sale of Steel and Tube Co. of America to Youngstown Company Temporarily Restrained

YOUNGSTOWN, Feb. 27.—Two stockholders' meetings of importance are scheduled this week, for Feb. 28, by the Youngstown Sheet & Tube Co., at Youngstown, and the Steel & Tube Co. of America, at Chicago. It is expected formal ratification of the sale of the Steel & Tube company will be made by its shareholders, despite the protest which has been lodged by the Allied Chemical & Dye Corp., of New York, holder of important blocks of common stock.

At Wilmington, Del., Feb. 21, Chancellor Wolcott issued a temporary restraining order preventing the Steel & Tube company from disposing of its property to the Youngstown company. Chancellor Wolcott also issued a rule, returnable March 16, on the defendant company to show cause why a preliminary injunction should not be issued.

At Youngstown, the belief prevailed that the properties of the Chicago producer would be sold to the Youngstown independent on the basis of the terms previously arranged. President James A. Campbell of the Sheet & Tube company states that it is prepared to fulfill its part of the agreement, and any new arrangements with respect to sales terms must be made between the majority and the protesting minority groups in the Steel & Tube company. The question at issue, he states, is one between these groups, and not one in which the purchaser is interested.

Court action discloses that the Allied Chemical & Dye Corporation owns 16 per cent of common stock of the Steel & Tube company, on which it claims a valuation of \$6,500,000. Under terms of the sale, the Sheet & Tube company is to pay \$15 per share for the common stock of Steel & Tube, or approximately \$15,000,000 for the entire amount.

At their meeting, Sheet & Tube company shareholders will also consider matters arising in connection with the formal taking over of the plants in the Mahoning Valley of the Brier Hill Steel Co. While the Sheet & Tube company is informally directing the Brier Hill company's operations and policies, no formal transfer will be made for some time. The Brier Hill company's organization will remain intact until April 1 to a large extent, although changes of a minor character are already being effected in the organization.

Machine Tools Discussed at Philadelphia

Effect of Variations in Design of Milling Cutters Discussed —Large Machine Tools Also Feature Meeting

MACHINE tools was the subject of a conference held Feb. 27 in Philadelphia, under the auspices of the Engineers' Club of that city, and the local sections of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, including the machine shop practice division of the American Society of Mechanical Engineers.

The results of a series of investigations at the plant of the Brown & Sharpe Mfg. Co., Providence, R. I., to determine the effect of changes in the design of milling cutters were presented in a paper on "Milling Cutters: The Influence of Differences in Design on Power Consumption and Capacity." The paper was presented by James A. Hall, associate professor of mechanical engineering, Brown University, and Benjamin P. Graves, milling machine engineer, Brown & Sharpe Mfg. Co., joint authors. It was offered as a study of the effect of changes in the number of teeth, spiral angle, rake angle, and cutting speed of the cutter on power consumption, tendency to chatter, and stresses set up in the machine.

The conclusions reached by this study were stated as follows:

Coarse-tooth milling cutters require less power to remove a given amount of metal per minute than fine-tooth cutters. This is true on both wide and narrow work, although the margin in favor of the coarse-tooth cutter is greater on wide cuts. It is also true if both cutters are compared on a chip-per-tooth basis.

When compared on a chip-per-tooth basis the finish given by the coarse-tooth cutter is better than that by the fine-tooth cutter on account of the closer spacing of revolution marks.

Low-cutting-speed operation of fine-tooth cutters to give a large feed per tooth is objectionable on account of the increased stresses in the machine and holding fixtures.

Fine-tooth cutters are much inferior to coarse-tooth cutters when the relative tendency to chatter is considered.

Moderate rake angles reduce the power consumption and are desirable on all cutters to be used on mild steel. Large rake angles are undesirable due to the tendency to chatter.

The spiral angle has little effect on the power consumption. A considerable spiral angle is desirable, however, because it makes possible the use of fewer teeth, gives smoother cutter action, and reduces the tendency to chatter.

Hence, with the few exceptions noted, coarse-tooth cutters of the type now generally manufactured are superior to fine-tooth cutters for all classes of production work.

Tests Made Under Shop Conditions

The tests were made as far as possible under shop conditions, using, however, sufficient refinement of measurement to give highly accurate results. Most of the tests were made with the work held rigidly on the table of the machine, which was an old style Brown & Sharpe No. 3 heavy plain milling machine with constant speed down shaft. Power used by the cutter was determined from the figures of the input into the motors driving the machine. Upon the table of the machine, a fixture was placed into which dove-tailed steel specimens 6 in. wide and 18 in. long could be fastened by means of a gib. The cutters were keyed onto a 1½-in. arbor, arbor supports were used on both sides of the cutter and the outside braces were bolted during the tests.

In getting information concerning power requirements of the cutters, the spindle and table were driven by separate motors. A prony brake was then placed on the arbor and a series of tests run to get the efficiency of spindle drive at different capacities and speeds. The power input required to run the arbor at no load varied slightly with the speed and condition of lubrication. The brake-hp. output was always nearly the same for any added kw. input over the no-load reading. A hp.-kw. curve was then drawn, where the power delivered to the arbor was one coordinate, and the dif-

ference between the no-load kw. reading and the reading under load the other. The authors took as the net power required by the table, the difference between the motor output under load and that when driving the feed mechanism alone.

Cutters of high speed steel and 3½-in. in diameter were used on all tests, except a few tests with two 6-in. side milling cutters. The 3½-in. cutters used to determine the effect of the number of teeth had 30-deg. spiral angles and 10-deg. rake angles. A 20-tooth cutter was put at one end of the series, an 8-tooth B. & S. cutter came in the middle and a 4-tooth cutter added to give an extreme condition of coarse spacing. A number of tests were also made with a 10-tooth cutter and additional comparisons were made between two 6-in. side milling cutters, one of which had 12 teeth and the other 26 teeth. The latter was 15/16 in. wide, and the former 1 in. Other sets of cutters alike in every particular, except the element to be studied, were used in the tests to determine the effect of variations in spiral angle and rake angle.

Method of Making Tests

Mild steel was used in all tests and the blocks of metal were fairly uniform. A light cut was taken along the specimen before starting any test to guarantee that the depth of cut would be constant. The table was then fed up the desired amount and from two to six tests were made at this depth in the 18 in. length of the block. At the end of the first cut the table was run back and the depth of cut checked, the exact figure for the feed was determined by taking the time with a stop watch and measuring roughly the distance traveled with a steel scale and correcting this figure to a thousandth of an inch by reading the dial on the lead screw hand-wheel. In this way the exact amount of metal removed per minute was determined.

As far as possible comparative tests on different cutters were made on the same block of steel and their order was arranged so that corresponding runs came as nearly as possible at similar positions on the block. This was intended to reduce to a minimum errors due to lack of uniformity in the metal.

The results are plotted in the form of curves having as one coordinate either hp. per cu. in. or pressure along the table. For the other coordinate cu. in. per min. feed per tooth or maximum chip thickness are used.

Varying of Number of Teeth in Cutter Studied

Several groups of tests were run in the studies of the effect of varying the number of teeth in the cutter. The speed and depth of cut were kept constant and the feed varied in the first group. The second group contains tests where the feed and depth of cut were kept constant and the cutting speed varied. In the third group, the depth of cut was kept constant and the cutting speed varied with the feed so as to give a constant chip per tooth. The results of these and other series of tests were discussed in detail and graphs shown by lantern slides.

It was brought out that chatter rather than power of the machine is often the limiting factor in milling. "For this reason," the authors state, "many engineers urge that more rigid machines be built to eliminate this trouble, without realizing that a great deal may be accomplished by the proper choice of cutters." A summary of the elements which affected chatter in these tests was given in the following paragraph.

"The most important point is, that tendency to chatter was greatly reduced as the number of teeth in the cutter approached a low figure. On many cuts where it was impossible to eliminate chattering of the 20-tooth cutter by any reasonable change in speed, no

trouble was experienced with four- or eight-tooth cutters. Furthermore, some trouble was experienced with the eight-tooth cutter on wide and deep cuts at high feeds, but no chattering occurred on any cuts with the four-tooth. Increase in spiral angle also reduces the tendency to chatter, and a combination of wire-spaced teeth and steep spiral angle in a cutter will give the maximum capacity along this line. Moderate rake angles increase the tendency to chatter but little, while large rake angles greatly decrease the capacity of the cutter. The proper consideration of these factors in the choice of cutters will eliminate much trouble in this respect."

Discussion Animated

In the discussion several speakers agreed to the superiority of coarse tooth cutters. Fred A. Parsons, Kearney & Trecker Co., Milwaukee, in his discussion, said that he would take some exception to the use of the item of "speed per tooth" or "maximum chip thickness" as a basis for any comparison of cutting tools, such a comparison becoming inaccurate as soon as it involves different depths of cut or milling cutters of different diameters or of a different type. That the superiority of coarse tooth cutters does not hold true for face mills was pointed out in another part of the paper.

Carl J. Oxford, National Twist Drill Co., expressed disappointment in the paper because of its narrowness of scope. He gave as his chief objection that the authors have attempted to draw general conclusions from what is unquestionably a special case. That only mild steel was used throughout was said to be perhaps the most serious objection to applying generally the results recorded. The rigidity of the machine and holding devices, depth and width of cut and the ability of the machine to deliver power to the cutter, and structural strength of the cutter were said by Mr. Oxford to be the limiting factors for numbers of teeth. "In designing for general use," he said, "the importance of these various factors must be weighed and the number of teeth selected which takes them into account without sacrificing too much of the productivity of the cutters."

Speaking of quality of finish, Mr. Oxford said that the actual production factor was not so important as it used to be, because any surfaces requiring good finish are usually ground. The entire argument regarding finish is only applicable to slabbing cuts, he pointed out.

Prof. John Airey, University of Michigan, who was a joint author of the paper on "The Art of Milling" read at the American Society of Mechanical Engineers' annual meeting Dec. 5, 1921, also discussed the paper. He agreed with the authors on the question of rake, and said that it was strange that so many milling cutters are being made today without rake. He also agreed on the matter of constancy of materials, or lack of it. He disagreed on the method of reckoning the power and method of charging power loss to the cutters. That the factors controlling the grinding life of the cutters were not considered in the paper was regrettable. Carl G. Barth, Philadelphia, and W. A. Knight, of the Ohio State University, also discussed the paper.

Problems Met in Designing Large Machine Tools

The problems and limitations in the design and construction of large machine tools, by which he said he meant machines for accurate cutting and finishing as distinct from those for metal working other than finishing, were outlined in a paper by G. H. Benzon, Jr., engineer, William Sellers & Co., Philadelphia.

Shops building hydroelectric machinery, marine engines, blowing engines and rolling mill machinery were classed as the main sources of demand for large machine tools. Large marine Diesel engines, if commercially developed in this country, were emphasized as probably widening the market for large machine tools.

The requirement for large tools being very irregular, it was pointed out that they cannot be constructed or handled as a continuous manufacturing process, and this affects all branches of the industry from the design to the final inspection. "The market has been so irregular," said Mr. Benzon, "as to make it seem inadvisable or uneconomical to equip and maintain establishments for the sole purpose of building such tools." The machine-tool builder in many instances has to use average large-shop equipment to produce tools of a larger size than any he has in his establishment, a condition which was pointed out as requiring considerable attention from the designer, who must plan the large units of the machine so that they may be handled by existing equipment.

Considerable interest was shown in this paper and lantern slides were used to illustrate various large machines.

Limitations Imposed on Designer

Large patterns, it was pointed out, are bulky in storage and expensive in maintenance, and in many cases the designer must try to adapt them to a variety of uses. Another factor mentioned was limiting the sizes of parts that can be conveniently shipped. "The quality of machine tools for finishing is dependent on sound design backed up by expert foundry and machine work," said Mr. Benzon, adding that "all of these factors must rest on the foundation of experience, not only that of the individual, but that which lies in the records of an establishment."

The grade of mechanic required in building big tools was said to be much higher than the average, and detailed planning and instruction being rarely applicable to such work, the individual experience of the men has an appreciable effect on the character of the work produced.

The special knowledge required in the pattern shop, foundry and the machine shop was outlined. In the machine shop the castings must be properly handled to produce accuracy. Castings as they come from the foundry contain a great number of internal stresses. When some of these are released in machinery, others that they have been balancing are also released, producing, it was said, distortion. It is necessary that these large castings be rough machined in the proper sequence of operations, and that enough time be given for the stresses to work themselves out before final conditioning.

Fitting of Main Bearings

Variations in temperature between night and day, and between floor temperatures and temperatures at a height of 25 ft. above, were said to be disturbing factors in building larger machine tools. Due allowance for variation in temperature, the tuning of tests and inspection during the course of erection, to fall under proper conditions, are very necessary, he said, in building these machines.

In discussing the fitting of main bearings on large tools, Mr. Benzon pointed out that main bearings in high-grade machine tools are bushed in order that (1) the best possible metal may be provided for the bearing surface, and so that (2) in case of accidental cutting or scarring or wearing in service, the bearing may be renewed, replacing the old bushing. In order that replacements may be properly effected, the bushings are first bored and then turned on a mandrel, so that concentricity of their inner and outer surfaces may result. This, he emphasized, assures that a replaced bushing will restore correct alignment. The practice of boring bushings after they have been fastened in the stand was characterized as bad.

Problems in Boring Mills and Planers

A specific case of the problems confronting the designer of large machine tools was given in a discussion of the building of a large boring and turning mill which swings 35 ft. and has a maximum clearance of 18 ft. between the work table and the underside of tool heads. Another example was given in a large planing machine,

having a table to plane work 36 ft. long, the over-all length of the bed being 65 ft. 8 in. The clearance between the housings is 16 ft. 2 in.

Boring mills and planers were said to have been selected from which to draw the examples given, because they represent the two outstanding largest types of surface-finishing machine tools constructed. "Indi-

cations are," said Mr. Benson, "that still larger planers and boring mills will be built in the near future than have been built before."

There will shortly be in the market, he said, an inquiry for a planer to plane 20 ft. between the housings, and a boring mill to swing 40 in. between the uprights.

Group Drives and Direct Connected Motors

Improvements in Leather Belting Quality Offset the Previous Trend Toward Direct Motor Drive

BY LOUIS W. ARNY*

THE use of direct connected motors on general machinery is not materially different from their use on machine tools. Some fifteen years ago Fred W. Taylor said:

"I am firmly convinced, through large observation in many shops, and through having systematized two electrical shops, that in perhaps three cases out of four a properly designed belt drive is preferable to the individual motor drive for machine tools. There is no question that through a term of years the total cost of individual motors and electric wiring, coupled with the maintenance and repairs of this system, will far exceed the first cost of properly designed shafting and belting, plus their maintenance and repairs. There is no question that in many cases the motor drive means in the end additional complications and expense rather than simplicity and economy."

In the fifteen years which have since elapsed, numerous changes have occurred in the various factors bearing on this subject. It is well understood that today the motors are better developed and improved, and there has been radical progress in the improvement and standardization of qualities in leather belting, but perhaps the greatest improvement has been in shafting and bearings, by which the friction load of an ordinary belt drive has been greatly decreased.

The advantage in the use of the direct connected motor is largely in the removal of the obstruction occasioned by the presence of the belt, and the more compact installation which is possible, and possibly the elimination of some amount of bother and trouble resulting from the use of inferior or improper belts. These all are advantages, but in favor of the group drive we have, first, the much lower cost of installation. Motors are very costly to buy, and, in the case of one motor driving a group of, say, six machines, as compared with six separate motors, the original installation cost of the belts may often be no more than the annual interest and depreciation costs on the motors, to say nothing of their first cost. This is due principally to the high first cost of the motor. The exact relation would be different in every drive, due to difference in lengths of belts and shafts, but speaking in a general way, with shaft and belt drives of ordinary length, the interest on the investment and the amortization on the motors for one year will go far toward paying for the total cost of the belt and shafting installation.

The capital investment might not be much of a consideration, if there shall result such savings as will justify it, but in rare cases only are these savings apparent with the motor connected directly with the machine. The motor must be of sufficient capacity to start the machine, as well as to keep it in operation after it is started, and it must have sufficient capacity also to be able to handle any overloads which may be placed upon it. This requires that the motor shall be considerably larger than is necessary merely to drive the machine in operation. The margin of safety in these cases will be variable according to the nature of

the work to be performed, but usually the motor must be capable of transmitting twice, and sometimes three times, its normal load. This accounts for a considerable part of the large investment necessary, and it also means that these motors are running normally under a load of from 40 to 75 per cent of capacity.

Gordon Fox, in discussing this subject,† shows that the efficiency of motors is dependent upon their relative loads, and that this varies in various types of motors from as low as 65 per cent at 25 per cent load to 90 per cent at 100 per cent load. On the other hand, a good leather belt, in ordinarily good condition, will transmit power from one pulley to another with an efficiency of 98½ per cent, as has been repeatedly demonstrated at the Research Laboratory of the Leather Belting Exchange Foundation at Cornell University. On the very fine apparatus there, in which power is transmitted from a motor to a generator through a belt, it has been found that where 25 hp. is being absorbed by the generator shaft, it is necessary to supply 32 electrical hp. to the motor, a loss of 7 hp., or about 22 per cent. Of this loss, 1½ per cent is in the belt and consists of bendage, windage, creep and slip, the latter being responsible for the larger part of it. It may be assumed that these results are at least as good as those attained in general practice, and probably better, because of the high character of the installation, and the superior care which it receives. It will be observed that this result is in close accord with the figures given by Mr. Fox.

Mr. Taylor made the comparison between the two forms of transmission in very general terms, because an actual comparison can be made only by a careful study of each particular drive, but the high efficiency of the leather belt, and the low efficiency of the motor, doubtless were at the bottom of his conclusions.

The motor is a delicate piece of machinery which must have constant care to keep it clean and in adjustment. Brushes and commutators wear and need frequent renewals, and not infrequently an accident will throw upon the motor a load greater than it can handle, and a burned out armature results. Renewals of this character require expensive repairs from skilled mechanics. On the other hand, the leather belt has an overload capacity of 100 per cent to meet the shocks of accident. It may be made endless on the pulley by any ordinary mechanic and, when new, will require taking up two or three times until it is established in its work, and then proceeds without any especial attention.

It needs to be wiped off occasionally, and once in a while should have an application of belt dressing, but it then can be depended upon to transmit its full load regularly every day without special attention, and for a long time without repairs, and such attention as is required can be supplied readily by any mechanic in the plant. In case of accident to the belt the same mechanic can make repairs, and anybody can make temporary repairs which will keep the machine in operation. A broken belt, as compared with a burned out armature, means that the machine is out of com-

*Secretary Leather Belting Exchange, Philadelphia, Pa.
†Power, May 9, 1922.

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Iron and Steel Markets

ADDED MARKET STRENGTH

Shown by Sheet, Tin Plate and Wire Rod Quotations

Further Second Quarter Contracting Waiting on Price Decisions—Pig Iron Higher

In the period of a month not only has the price basis of current quarter steel contracts become strongly fixed but what has been booked at higher prices for April, May and June delivery is substantially as firmly established. Steel has advanced \$2.85 a ton in this time on the average and now a Steel Corporation subsidiary, without any intention of taking any more business at the moment, has marked up sheets \$3 to \$6 a ton to the levels from which independent makers have just risen.

The American Sheet & Tin Plate Co. also has raised tin plate to \$4.95 a base box, \$4 a ton up. In the light that no orders are sought, the act is taken to show what may be the basis of third quarter sales. Some independents are now asking \$5 a box, and small lots have sold at \$5.10.

Considerable open capacity for other forms of steel is still not engaged for the second quarter. The price basis for much of it is expected to be settled by the middle of March. Meanwhile the market is orderly, regular consumers being assured of protection for their normal needs. Signs are wanting of a runaway market. Spectacular premiums apply to a relatively small tonnage.

Quite a little of recent demand has come from jobbers and to that extent at least orders have been for the building up of stocks rather than for early use. Warehouse advances are imminent, seeing that mill prices have now reduced the spread to the distributor.

Operations have so far bettered that the whole industry is nearer 90 than 85 per cent of capacity. In some quarters loss of labor to outdoor occupations is not a cause of concern. The present rate is believed possible for some time. Plans in the Pittsburgh district call for putting more furnaces in blast in the next few weeks and an Illinois Steel Co. stack, banked a week ago, is again active in spite of limited fuel deliveries.

Buying of pig iron has been widespread, representing many melters and making a large aggregate tonnage. In nearly all centers, greater firmness has resulted, while in the East foundry grades have advanced \$1 and at Pittsburgh an advance of 50c. has been established on steel making grades, and 50c. more is being asked on foundry iron. In the South the situation is strong, following the withdrawal from the market of several large companies.

THE IRON AGE composite price for pig iron has advanced to \$27.79 from \$27.38 last week, the highest since mid-November. At the end of January it

was \$26.88. One year ago it stood at \$18.10, near the bottom of the lowest swing since the fall of 1916.

Uncertainty of the developments of the admittedly strong semi-finished steel market accounts in part for the refusal of forward commitments in finished products. With indications of \$42.50 shortly for billets, sheet bars and slabs, steel rails at \$43 for the second half are regarded out of line.

Two different bases of wire rods, depending on diameter, have been announced by the American Steel & Wire Co., resuming a practice of some years ago.

Sheets are more commonly quoted at 2.75c., Pittsburgh, for blue annealed, 3.60c. to 3.75c. for black and 4.70c. to 4.75c. for galvanized. Higher zinc accounts for the relatively greater advance of the galvanized product.

Fewer bars, plates and shapes are obtainable at 2.25c. than a week ago. Rail steel bars for concrete reinforcement are now 2.25c. Structural awards continue to pile up with 31,000 tons the week's total in sizable jobs. Among inquiries oil tank work again looms large.

Tie plates are now quoted at 2.60c., the 2.45c. price having disappeared on definite delivery orders. Spikes and track bolts have been further advanced by a number of important makers.

Railroad car orders exceeded 4500 and 3000 were added to the pending list. Cars are still obtainable in four to five months.

The British steel market is rapidly advancing. Rails are fully \$42 and tin plate \$5.05 to \$5.30. A number of American export prices have risen to the domestic levels.

Pittsburgh

Market Very Strong with Prices Advancing—Jobbers Are Buying

PITTSBURGH, Feb. 27.—The general complexion of the market here does not change much. It is still very strong with the tendency upward, although advances in the past week, outside of sheet and tin plate, have been in those lines intimately connected with bars. A distinct tendency on the part of makers of hot rolled flats to seek more than the regular market quotation of 2.90c. base, Pittsburgh, has been observed lately, while most sizes of railroad spikes have advanced \$3 per ton, and there are intimations of increases in prices of bolts, nuts and rivets, present quotations of which are declared to be out of line with 2.25c., the present minimum on steel bars.

The outstanding price change is the advance announced yesterday by the American Sheet & Tin Plate Co. on both sheets and tin plate. These increases were \$3 to \$6 per ton on sheets and \$4 a ton in tin plate. In view of the fact that this company is solidly committed against production for the first half of this year, and that it is distinctly stated that the new prices are not for third and fourth quarter tonnages, the explanation seems to be that the Steel Corporation is recognizing increased costs and observing its recent policy of following advances by independent producers. The official explanation is that the company is trying

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Feb. 27, Feb. 20, Jan. 30, Feb. 28,			
Per Gross Ton:	1923	1923	1923
No. 2X, Philadelphia	\$30.76	\$29.76	\$29.76
No. 2, Valley furnace	28.00	28.00	19.00
No. 2, Southern, Cin'ti	29.05	28.05	20.00
No. 2, Birmingham, Ala.	25.00	25.00	15.50
No. 2 foundry, Chicago	30.00	30.00	19.50
Basic, del'd, eastern Pa.	28.50	28.25	28.00
Basic, Valley furnace	27.00	26.50	26.00
Valley Bessemer, del. P'gh	30.27	29.77	29.27
Malleable, Chicago	30.00	30.00	29.50
Malleable, Valley	28.50	28.00	27.00
Gray forge, Pittsburgh	29.27	29.27	28.27
L. S. charcoal, Chicago	34.65	34.65	33.15
Ferromanganese, furnace	107.50	107.50	62.50

Rails, Billets, Etc., Per Gross Ton:

Per Gross Ton:	Feb. 27, 1923	Feb. 20, 1923	Jan. 30, 1923	Feb. 28, 1923
O.-h. rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$40.00
Bess. billets, Pittsburgh	40.00	40.00	38.50	28.00
O.-h. billets, Pittsburgh	40.00	40.00	38.50	28.00
O.-h. sheet bars, P'gh	40.00	40.00	39.50	29.00
Forging billets, base, P'gh	47.50	47.50	45.00	32.00
O.-h. billets, Phila.	47.67	45.17	45.17	33.74
Wire rods, Pittsburgh	50.00	50.00	47.50	36.00
Cents	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.25	2.25	2.10	1.40
Light rails at mill	2.15	2.15	2.15	1.40

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.575	2.475	2.475	1.76
Iron bars, Chicago	2.50	2.50	2.35	1.55
Steel bars, Pittsburgh	2.25	2.25	2.10	1.35
Steel bars, Chicago	2.30	2.25	2.10	1.50
Steel bars, New York	2.59	2.59	2.34	1.73
Tank plates, Pittsburgh	2.25	2.25	2.10	1.35
Tank plates, Chicago	2.50	2.35	2.30	1.50
Tank plates, New York	2.59	2.59	2.44	1.73
Beams, Pittsburgh	2.25	2.25	2.10	1.35
Beams, Chicago	2.40	2.35	2.20	1.50
Beams, New York	2.59	2.59	2.44	1.73
Steel hoops, Pittsburgh	2.90	2.90	2.75	1.80

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,		Feb. 27, 1923	Feb. 20, 1923	Jan. 30, 1923	Feb. 28, 1922
Per Lb. to Large Buyers:		Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh		3.50	3.50	3.35	3.00
Sheets, galv., No. 28 P'gh		4.60	4.60	4.35	4.00
Sheets, blue an'l'd, 9 & 10		2.65	2.65	2.60	2.25
Wire nails, Pittsburgh		2.80	2.80	2.70	2.40
Plain wire, Pittsburgh		2.65	2.65	2.45	2.25
Barbed wire, galv. P'gh		3.45	3.45	3.35	3.05
Tin plate, 100-lb. box, P'gh	\$4.95	\$4.75	\$4.75	\$4.60	

Old Material, Per Gross Ton:

Carwheels, Chicago	\$27.50	Carwheels, Philadelphia	25.00	Carwheels	\$27.00	Carwheels	\$15.00
Heavy steel scrap, P'gh	24.00	23.50	22.00	24.00	15.00	Heavy steel scrap, Phila.	22.00
Heavy steel scrap, Phila.	22.00	21.00	20.50	20.50	12.00	Heavy steel scrap, Ch'go	22.00
No. 1 cast, Pittsburgh	25.00	25.00	24.00	24.00	16.00	No. 1 cast, Phila.	25.00
No. 1 cast, Ch'go	24.50	24.00	24.00	24.00	16.50	No. 1 cast, Ch'go (net ton)	24.50
No. 1 cast, Phila.	25.00	25.00	23.00	23.00	15.00	No. 1 RR. wrot., Phila.	25.00
No. 1 RR. wrot., Ch'go (net)	19.50	18.00	18.00	18.00	10.75	No. 1 RR. wrot., Ch'go (net)	19.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt		\$7.00	\$7.00	\$9.00
Foundry coke, prompt		8.00	8.00	8.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	16.87 1/2	16.00	15.12 1/2	12.75
Electrolytic copper, refinery	16.50	15.75	14.75	12.50
Zinc, St. Louis	7.60	7.30	7.12 1/2	4.55
Zinc, New York	7.95	7.65	7.47 1/2	4.90
Lead, St. Louis	8.25	8.10	8.10	4.40
Lead, New York	8.25	8.15	8.20	4.70
Tin (Straits), New York	45.00	42.62 1/2	40.37 1/2	29.75
Antimony (Asiatic), N. Y.	7.37 3/4	7.12 1/2	7.12 1/2	4.35

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe.

These products constitute 88 per cent of the United States output of finished steel

{ Feb. 20, 1923, 2.631c.
Jan. 30, 1923, 2.489c.
Feb. 28, 1922, 1.998c.
10-year pre-war average, 1.689c.

Composite Price, Feb. 27, 1923, Pig Iron, \$27.79 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

{ Feb. 20, 1923, \$27.38
Jan. 30, 1923, 26.88
Feb. 28, 1922, 18.10
10-year pre-war average, 15.72

to avoid further commitments at this time. While the opinion is fairly general that prices now have reached levels where further increases might be harmful to the general good of the market, none dares the assertion that the top has been touched. Sources of supply have become fewer in recent weeks, and meanwhile the desire of buyers to get on mill order books has not abated.

There is a feeling that the present high rate of steel works operations cannot be sustained when open weather arrives with its consequent appeal to men to take up outdoor occupations. This will mean a further shortening in supplies, and in some quarters it is asserted that the American steel industry has not yet really begun to feel the effects of the Ruhr situation and its elimination of Germany as a factor in the world's market. But advances in the rediscount rate of the Federal Reserve Bank in New York and Boston and the slightly lighter situation in money introduce a note of caution into the situation. Moreover, there is no question that a considerable part of the recent demand and buying has come from jobbers as distinct from consumers and to that extent, at least, orders have been for the building up of stocks rather than for early use.

Still higher prices have been reached on pig iron

and scrap since a week ago, and the coke situation seems to be governed more by the course of iron and steel prices than by the market for coal. Furnace coke for second quarter promises to be just as costly as that for the current quarter, and merchant furnace interests seem unable to weaken the market of the argument that it is entirely out of line with coal prices. The fact that so many furnaces are likely to go in during the next few weeks also tends to keep up the price ideas of coke producers. Shortage of box cars continues to hamper operations of finishing mills dependent on that kind of railroad equipment for shipments of the products, but the general operations in this and nearby districts have lost no grounds in the past week.

Pig Iron.—Further advances have been recorded in practically all grades of pig iron since a week ago, Bessemer and basic being up 50c. a ton on sales, while there has been a like increase in the asking prices on foundry iron. In the latter grade, producers' price ideas have advanced a little more rapidly than those of consumers and this has tended to keep down actual business. Inquiries for small tonnages are pretty numerous and the real market should soon be established when the Westinghouse Electric & Mfg. Co. closes for about 5200 tons for which it has inquired,

3000 tons for its Cleveland works and the remainder for Tafford City. The foundry market this week is quotable at from \$28 to \$28.50, Valley furnace, on the base grade. On basic iron \$27, Valley furnace, now is minimum, and there have been sales up to \$27.50, with the latter price now commonly asked. We note sales of 1000 tons of standard Bessemer iron and several smaller tonnages, all at \$28.50, Valley furnace, and there is some doubt whether any more of this grade can be had that low. As high as \$29, furnace, is being quoted, but no sales at that figure have been reported. The prediction is freely made that \$30 iron is not far off, and based upon the present cost of coke there are some producers who could not get out profitably for less. The impression is gaining ground that ore prices will not be any lower than they were last year and some are looking for an advance of 25c. to 50c. per ton over last year's base of \$5.05 for Mesabi non-Bessemer at lower lake docks. On the other hand, there is a feeling that if steel mill operations suffer from labor shortages, the steel companies a little later may have pig iron for sale. Only 26 furnaces are idle in this and nearby districts out of a total of 138, and at least six others are likely to go in blast in the next few weeks. Labor shortages do not affect blast furnace operations as they do those of steel works and finishing mills.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.77 per gross ton:

Basic	\$27.00 to \$27.50
Bessemer	28.00 to 29.00
Gray forge	27.50 to 28.00
No. 2 foundry	28.00 to 28.50
No. 3 foundry	27.50 to 28.00
Malleable	28.50 to 29.00
Low phosphorus, copper free	35.00 to 36.00

Ferroalloys.—Domestic producers of ferromanganese have not yet gone along with the advance of \$2.50 per ton recently announced by British makers, but their quotation of \$107.50, f.o.b., furnace, is largely nominal, as they are sold up against most of their production for the current half year and have not yet opened books for second half tonnages. Only regular customers are being accommodated at \$107.50, and then for small lots. Spiegeleisen now is quotable at \$35 to \$37, furnace, for 19 to 21 per cent, the higher figure being that of the Cambria Steel Co., which has found its recent price of \$36 to be unprofitable. Material running 16 and 19 per cent in manganese content ranges \$1 a ton less than the higher grade. We note one inquiry for 1000 tons of the lower grade. There seems to be a shortage of 50 per cent ferrosilicon and none appears to be available at less than \$87.50, delivered, while as high as \$90 is being quoted.

We quote British 80 per cent ferromanganese \$110, c.i.f. Atlantic seaboard, duty paid, changes in the duty for buyer's account, or \$114.79 delivered Pittsburgh; domestic, \$107.50 f.o.b. furnace; 50 per cent ferrosilicon, \$87.50 to \$90; spiegeleisen, 19 to 21 per cent, carloads, \$35 to \$37, furnace; 16 to 19 per cent, carloads, \$34 to \$36, furnace, with larger lots lower according to the quantity; Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$45.50; 11 per cent, \$48.80; 12 per cent, \$52.10; 13 per cent, \$56.10; 14 per cent, \$61.10; silvery iron, 6 per cent, \$34; 7 per cent, \$35; 8 per cent, \$36.50; 9 per cent, \$38.50; 10 per cent, \$40.50; 11 per cent, \$43.80; 12 per cent, \$47.10. The present freight rate from Jackson and New Straitsville into the Pittsburgh district is \$3.66 per gross ton.

Semi-Finished Steel.—The interesting development of the week is the announcement of the American Steel & Wire Co. that its price of wire rods is \$47 for No. 5 1/4-in. and \$49.50 for coarser stock. This step restores the practice of some years ago of quoting different bases on the various sizes. Independent makers continue at \$50 for No. 5 size, and this is probably nearer the going market, since the leading interest appears to have no rods available for early delivery. The market on other forms of semifinished steel is purely nominal. It is reported that \$42.50, Pittsburgh, has been named against one second quarter inquiry for sheet bars by a Pittsburgh district sheet maker, and there are reports that \$42.50 actually has been done on open-hearth billets. Confirmation, however, is lacking. Present indications are that \$42.50 will be the second quarter contract base on billets, sheet bars and

slabs. We quote these forms at \$40 to \$42.50, but this range is merely an appraisal, based on what buyers will pay and what is asked when a price is mentioned at all. Few makers of forging billets today will consider less than \$50, base, unless buyers are willing to take steel with a small discard, and chipping has been only partially done. Skelp cannot be bought at less than 2.25c., and with plates fetching as much as 2.50c. for early delivery, some mills are unwilling to take on skelp business at less. Prices are given on page 641.

Iron and Steel Bars.—The regular market on steel bars now is well established at 2.25c. base, but business at that figure is for delivery at convenience of the mills and premiums of \$2 to \$5 are being asked and obtained on specific deliveries.

We quote steel bars rolled from billets at 2.25c. to 2.50c.; reinforcing bars, rolled from billets, 2.25c. to 2.50c. base; rail steel reinforcing bars, 2.10c. to 2.15c.; refined iron bars, 2.75c. in carloads, f.o.b. mill, Pittsburgh.

Wire Products.—Pressure for supplies from distributors and manufacturers still is heavy, and with all makers solidly booked for the next two months, new business goes begging. At least two large independent producers are out of the market for the present and find some difficulty in making headway against their commitments owing to a continued labor shortage, which is more acute in wire plants than in most other kinds of finishing plants. There still are three distinct sets of prices, but until more nearly normal trading conditions are established and business is again on an open basis, quotations will not mean much. Prices are given on page 641.

Steel Rails.—Light rails rolled from billets remain quotable from 2.15c. to 2.25c. base, mill. More makers are trying for 2.25c. base, than recently, but in competitive territory, 2.15c. is the maximum, and demand generally is hardly sufficient to permit sales of any account above that figure.

We quote 25 to 45-lb. sections, rolled from new steel, 2.15c. to 2.25c. base; rolled from old rails, 2c. to 2.10c. base; standard rails, \$43 per gross ton mill for Bessemer and open-hearth sections.

Sheets.—Effective yesterday, the American Sheet & Tin Plate Co. announced new prices, showing advances of \$3 to \$6 a ton over those named last fall for first half of 1923 tonnages. The new bases are 3.50c. for black, up \$3 per ton; 2.65c. for blue annealed, up \$3 per ton; 4.60c. for galvanized, up \$5 per ton, and 5c. for No. 22 gage automobile body stock, up \$6 per ton. The company also advanced prices of electrical sheets, which were not disturbed in the advance of last fall, \$5 a ton. It is distinctly stated that these prices are not for third quarter tonnages, for which the company has not opened its books, and that since it cannot take more business for delivery between now and July 1, the object of the advance is to check inquiries for a place on its books. Higher prices are justified by the advance in spelter, now up around 7.55c. per lb., as compared with 7c. or less when former prices were named and the increases that since have occurred in other raw materials. Labor costs automatically rise with the rise in selling prices. An advance in sheet bars for second quarter, as compared with those for the current quarter, is a certainty. Independent makers have advanced prices also, now naming 3.75c., base, on black, generally, 4.75c., base, for galvanized and 2.75c., base, for blue annealed, although some will observe Steel Corporation levels to some extent. On auto body stock, independent makers are quoting from 5.25c. to 5.50c., base, No. 22 gage. One independent is quoting blue annealed sheets at 2.75c., base, for No. 12 gage and heavier and 2.90c., base, for No. 13 gage and lighter, but adoption of a double base by others is improbable. Such an arrangement would produce a price of 2.70c. for No. 8 gage; 2.75c. for Nos. 9 and 10 gages; 2.80c. for Nos. 11 and 12 gages; 3c. for Nos. 13 and 14 gages, and 3.10c. for Nos. 15 and 16 gages. There have been sales of blue annealed as high as 3.10c., base, but this was a small tonnage for very prompt shipment. Makers have heavy orders and demand is active. Prices are given on page 641.

Tubular Goods.—The situation generally is very firm, because makers, already heavily obligated, find no let up in the demand and are lacking sufficient supplies of raw materials to bring production up to the point warranted by their orders. This is particularly true of steel pipe and tubes, a number of makers of which are seeking supplies of skelp to piece out their own production. There are intimations of a further advance in seamless steel tube prices, but in the face of such reports, it is said that some makers are not adhering strictly to present schedules on desirable business. An advance in welded steel tubes would be more natural, since there is a real shortage of that class of goods. Oil country and line pipe are in demand, and on standard pipe salesmen have become merely order takers. More business in steel pipe is being declined than is getting on to mill order books, and this condition is helping to some extent the demand for wrought iron pipe. Discounts are given on page 641.

Tin Plate.—Several of the independent makers have advanced prices \$5 per ton to \$5 per base box Pittsburgh for standard cokes since a week ago, the increase being applicable alike to such business as can be taken for early as well as third quarter shipment. This is not the maximum independent price, as sales of several good-sized lots have been made at 5.10c. and some mills are not keen for business even at that price. The American Sheet & Tin Plate Co. also has advanced prices, but by \$4 a ton instead of \$5 as by the independent makers, its new price being 4.95c. per base box. As with sheets, the prime motive in this advance by the leading interest is to lessen the insistence of buyers to get a place on its books. The new price is not for third and fourth quarter tonnages, for which the company has not yet opened its books. It is known to have turned down several good-sized orders at the new base. Justification for the advance is claimed in the advance which has taken place in pig tin, now around 41 1/4c. a pound, against 36c., when the former tin plate price was named, and in acids and other materials. Terne plate also has been advanced, and a revision of the differentials is in progress. On 8-lb. coating the new price is \$9.90 per package of 200-lb. and on 8-lb. coating, I. C., the new price is \$10.20. Under the old schedule the latter was double the base price of standard coke tin plate, plus 10c. for coating, but such a differential is declared to be insufficient in view of the recent advances in metals.

Cold-Finished Steel Bars and Shafting.—Strength of hot-rolled bars, forecasting still higher prices for cold-finished steel bars, explains a very lively market in the latter. At 2.25c. for hot-rolled bars and 2.80c. base for cold-finished, the spread is \$11 a ton as against \$13 recently. The market is naturally very firm at 2.80c. base, for carloads, although it is reported that one producer, while observing that price on contracts, has recently taken spot business at the old base of 2.65c. Ground shafting is unchanged at 3.20c. base, f.o.b. mill, for carload lots.

Structural Material.—The market is now squarely set at 2.25c. base, Pittsburgh, as a minimum, and advances of \$2 to \$5 a ton over that figure are commonly quoted when delivery must be prompt. Structural shops in this district are busy, although most of the awards in this territory lately have been for small tonnages. Complaint still is heard that bids on structural jobs do not yet reflect the plain material market. Prices of plain material are on page 641.

Plates.—While the corporation holds at 2.25c. base, and some of the independents also regard that figure as regular market price, no business can be placed at that figure except for delivery at convenience of the mill, and prompt shipments usually command from 2.35c. to 2.50c. Some makers are quoting 2.25c. to 2.50c., f.o.b. mill. Prices are given on page 641.

Hot-Rolled Flats.—Makers willing to take on additional business at the regular base of 2.90c., Pittsburgh, are fewer than recently, and 3c. to 3.25c. now is the more common range, with 3.40c. to 3.50c. being demanded for light gage stock 1 in. and narrower in width. Prices are given on page 641.

Cold-Rolled Strips.—The regular quotation of 4.75c.

base, Pittsburgh, lately has become merely the base on contract shipments and consumers in need of early deliveries have found a number of mills unwilling to go below 5c. base, and some are openly quoting 5.25c. base.

bolts, Nuts and Rivets.—Shortage and strength of steel bars are imparting a firmer tendency to bolt, nut and rivet prices, and leading rivet producers are considering an advance to \$3.25 per 100 lb. base for large structural rivets, on the ground that with steel bars at 2.25c., rivets are unprofitable at less than \$3.25. It is doubtful, however, whether much of the steel now in process stands makers more than 2c. base. Discounts and prices are given on page 641.

Track Fastenings.—Effective today, leading makers of spikes announced advances of \$3 a ton in all classes of railroad spikes. The new prices are \$3.05 to \$3.15, base, per 100 lb. for 9/16 in. and larger; \$3.65 to \$3.75 for 1/2 in., 7/16 in. and 5/8 in., and \$3.75 for 5/16 in. Bolt and barge spikes are unchanged at \$3.50, base. These increases are a reflection of the strength of the steel bar market to a large extent. Local prices of track bolts are unchanged. Prices are given on page 641.

Coke and Coal.—We make no change in coke prices from those of a week ago, leaving furnace coke at \$7 to \$7.25 and foundry grade from \$8 to \$9. Sales of spot tonnages of furnace coke occasionally are noted at less than \$7, but on contracts that price is minimum despite efforts of merchant blast furnace interests to negotiate more favorable terms. With coking coal at \$3 to \$3.25 and one and one-half tons of coal to the ton of coke, producers would have ample profit at \$6.25 for the coke, but this argument is not effective with so many blast furnaces in or going in, presaging a coke demand of huge proportions. Such contracts as have been concluded have been at from \$6.75 to \$7 per net ton, oven, but the higher figure now is minimum. Steam coal ranges from \$2 for Fairmont up to \$3 for Panhandle tonnages, while the quotable range on coke and gas coal is \$3 to \$3.25 per net ton at mines, for mine-run grade.

Old Material.—The market here still is gaining in strength and is at least 50c. a ton higher than a week ago on the open-hearth grades. We note sales of heavy melting steel at \$24.50 delivered to a nearby plant and \$24 now is positive minimum on this grade since a higher equivalent is obtainable both east and west of this center. As a rule dealers are more active in the market than are melters, and the highest prices are being paid by the former, who find offerings scant and are influenced to buy not only by that fact, but because the trend of pig iron prices indicates even higher prices. Steel foundries, which have been using munition scrap, find the supply of such material pretty well exhausted, and find it hard to secure low phosphorus melting steel except at stiff advances over former prices. Some of the trade regard present prices as high enough and look for easier conditions in the spring, when it is expected mill operations will be reduced and the consumption of scrap lessened by labor shortages. Pennsylvania Railroad, Eastern Region, list offers 18,000 net tons of scrap, bids for which must be in March 1.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton		
Heavy melting steel.....	\$24.00 to	\$24.50
No. 1 cast, cupola size.....	25.00 to	25.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; and Franklin, Pa.	24.00 to	24.50
Compressed sheet steel.....	22.50 to	23.00
Bundled sheet sides and ends..	21.00 to	21.50
Railroad knuckles and couplers..	26.00 to	26.50
Railroad coil and leaf springs..	26.00 to	26.50
Low phosphorus standard bloom and billet ends.....	29.00 to	29.50
Low phosphorus, plates and other grades.....	28.00 to	28.50
Railroad malleable.....	26.00 to	26.50
Locomotive axles, steel.....	27.00 to	28.00
Steel car axles.....	26.00 to	26.50
Cast iron wheels.....	25.00 to	25.50
Rolled steel wheels.....	26.00 to	26.50
Machine shop turnings.....	19.00 to	19.50
Heavy steel axle turnings.....	22.00 to	23.00
Short shoveling turnings.....	19.00 to	19.50
Cast iron borings.....	20.00 to	20.50
Heavy breakable cast.....	22.00 to	22.50
Stove plate.....	18.00 to	18.50
Sheet bar crop ends.....	26.00 to	26.50
No. 1 railroad wrought.....	21.00 to	22.00

Chicago

Prices Advancing—Fear That Some May Go Up Too Fast

CHICAGO, Feb. 27.—As the scarcity of material grows more pronounced, prices tend more strongly upward. Locally both iron and steel tie plates have advanced \$3 a ton, and it is intimated that standard sections rails will also go up, presumably to cover last half contracts. It is also not improbable that the present minimum of 2.25c., Chicago, on soft steel bars for indefinite delivery will give place to a higher figure and plates and structural steel may likewise advance. The leading sheet producer has raised blue annealed and black \$3 a ton to 2.65c. and 3.50c. base, Pittsburgh, respectively, and galvanized \$5 a ton to 4.60c. base, Pittsburgh.

Rising prices have thus far had no unfavorable effect on business, in fact, the consumer's sole interest at the present time is to obtain sufficient material to sustain economical operations. Although every effort is being made by local mills to take care of the needs of their customers, unsatisfactory coal shipments are still limiting output.

The Illinois Steel Co. has succeeded in putting in the blast furnace at South Works which it was forced to bank a week ago, but otherwise local operations are unchanged.

While price advances have not yet had any noticeable effect on buying, both buyers and sellers are apprehensive that the present upward movement may go too far. It is already intimated that the railroads are less ready to place additional orders for cars, and there are those who fear that building activity will be checked. With the lessons of 1920 in mind, however, important steel producers can be counted on to exert a restraining influence on the market when surface indications point to a period of inflation.

Ferroalloys.—Another advance in ferromanganese is regarded likely on account of both the rise in sterling and expected advances by foreign producers. Practically all of the large consumers in this district, however, have covered their requirements for the first half. Spiegeleisen is in good demand, and is steadier following the absorption of resale material which was offered in the East. Fifty per cent ferrosilicon is scarce and the best going price appears to be slightly less than \$87.50, delivered Chicago.

We quote 80 per cent ferromanganese, \$115.06, delivered; 50 per cent ferrosilicon, \$87.50, delivered; spiegeleisen, 18 to 22 per cent, \$44.58, delivered.

Pig Iron.—Demand for both early shipment and second quarter delivery is active and prices are increasingly firm. The active capacity of the leading Northern merchant is now obligated for fully 75 per cent of the second quarter and if buying continues at the present rate, it will not be long until the output of the entire first half will be committed. Northern iron is now firm at \$30 base, Chicago furnace, although in a few recent sales quotations made before the advance were honored. A Michigan melter has closed for 1000 tons of malleable for early shipment. Second quarter sales include 3000 to 4000 tons of malleable for a Wisconsin malleable plant, which was divided among a number of sellers, 1000 tons of malleable and 500 tons of charcoal for a southwestern Michigan user and 800 tons of No. 3 and several hundred tons of No. 2 foundry for a local melter. Southern iron for all-rail shipment is firm at \$25 base, Birmingham. Among recent sales of all-rail material was one of 2000 tons for a Chicago melter. Southern foundry for shipment by barge and rail is still available at \$28.50, delivered, and a round tonnage has been sold at that price, including 2000 tons for a Chicago plant. A Michigan buyer has closed for 300 tons of 5 to 6 per cent silvery. Notwithstanding a few recent sales of Tennessee material at slightly under the Jackson County schedule, silvery is gathering strength with the possibility that it may again advance. There have been a number of sales of charcoal at the new price and cur-

rent carlot sales of low phosphorus at from \$39 up to slightly less than \$40, delivered Chicago, indicate increasing strength in that material. Electrolytic ferrosilicon is steadier with 13 to 15 per cent material bringing \$53 delivered Chicago.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards or, when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	\$34.65
Northern coke, No. 1, sil. 2.25 to 2.75	30.50
Northern coke, foundry No. 2, sil. 1.75 to 2.25	30.00
Malleable, not over 2.25 sil.	30.00
Basic	30.00
High phosphorus	\$29.50 to 30.00
Southern No. 2, first quarter	31.41
Southern No. 2, second quarter	28.50 to 31.01
Low phosphorus, sil. 1 to 2 per cent, copper free	39.00
Silvery, sil. 8 per cent	41.29

Plates.—Railroad car orders placed within the past week have added 34,000 tons of plates, shapes, and bars, as well as 4100 axles to local mill bookings. New inquiries for oil storage tanks involve a total of from 24,000 to 26,000 tons of plates. Demand for plates exceeds local supply, and, while Chicago producers are making every effort to satisfy the needs of their regular trade, buyers must look elsewhere for material for nearby delivery. Prices are strong, and it is doubtful whether the present minimum of 2.35c., Chicago, for indefinite delivery will last much longer.

The mill quotation is 2.35c. to 2.50c., Chicago. Jobbers quote 3.05c. for plates out of stock.

Bars.—With local mills unable to keep pace with the demand, and with mills east of here heavily sold, the problem of soft steel bar consumers is to obtain sufficient material to sustain operations on an economical basis. Heavy drafts are being made on warehouse stocks, and mills which are still able to make reasonably early shipments are selling at attractive premiums. Prices are strong and even for indefinite delivery. The present minimum of 2.25c., Chicago, will probably give way to a higher figure. Bar iron mills have accumulated substantial back logs, and, while their product is unchanged at a minimum of 2.50c., Chicago, the market is exceedingly firm, and an early advance would not be surprising. Hard steel bar mills are also well booked ahead, and have advanced prices to 2.20c., mill. One local producer has taken an order for 3000 tons of bar size angles from a big manufacturer.

Mill prices are: Mild steel bars, 2.25c. to 2.30c., Chicago; common bar iron, 2.50c. to 2.60c., Chicago; rail steel, 2.20c., Chicago mill.

Jobbers quote 2.95c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.95c. for rounds and 4.45c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.75c. base; hoops, 4.30c.; bands, 3.75c.

Sheets.—Both local producers have allocated their second quarter outputs at practically the same prices which they quoted on first quarter business. The leading interest, however, is expected to announce higher prices, which, of course, will apply largely on third quarter business. The ruling prices on material for fairly early shipment, as obtained by mills east of here, are 2.75c. base, Pittsburgh, for blue annealed; 3.60c. for black, and 4.70c. to 4.75c. for galvanized. The spread between black and galvanized has been increased, owing to recent advances in zinc.

Mill quotations are 3.35c. to 3.60c. for No. 28 black, 2.50c. to 2.75c. for No. 10 blue annealed and 4.35c. to 4.75c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote, f.o.b. Chicago, 4c. for blue annealed, 4.85c. for black and 5.85c. for galvanized.

Wire Products.—The volume of orders, specifications and inquiries is the heaviest in history. While the pressure for all products is strong, the demand for nails is especially insistent. The prices of the American Steel & Wire Co. remain unchanged, but those of

independents vary considerably, depending largely on the extent they are booked ahead. A number of mills are quoting \$2.90 on nails, while one producer continues to ask \$3 for mill prices. See finished iron and steel, f.o.b., Pittsburgh, page 641.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, \$3.50 per 100 lb., extra for black annealed wire, 15c. per 100 lb.; common wire nails, \$3.55 per 100 lb.; cement coated nails, \$3 per keg.

Bolts and Nuts.—All indications point to an early advance in prices. Demand is heavy. Raw material is higher and deliveries of steel from the mills are below the needs of bolt and nut shops.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to $\frac{1}{2}$ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to $\frac{1}{2}$ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, \$2.75 off; blank nuts, \$2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. will supply successful contractors with 2000 tons for Dayton, Ohio. Grand Junction, Colo., has awarded 1200 tons to the Colorado Fuel & Iron Co. Kalamazoo, Mich., has let 250 tons to the Lynch Foundry Co. Smith Center, Kan., postponed action on 1550 tons of 8-in. until March 2. At the moment, private business is heavier than that coming from municipalities. Prices are unchanged but strong.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$57.20 to \$58.20; 6-in. and above, \$58.20 to \$54.20; class A and gas pipe, \$3 extra.

Rails and Track Supplies.—An advance of \$3 a ton brings steel tie plates up to 2.60c., mill, and iron tie plates to 2.75c., mill. An advance in standard section rails is also looked for. Orders for track fastenings have been heavy for this season. Bookings of local nail mills during the week include 25,000 kegs each of track spikes and bolts and 2000 tons of angle bars.

Standard Bessemer and open-hearth rails, \$43; light rails, rolled steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 3.15c. mill; track bolts with square nuts, 4.15c. mill; iron tie plates, 2.75c.; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.65c. base and track bolts, 4.65c. base.

Warehouse Prices.—Wire and nails, cold-rolled steel bars and shafting have been advanced by local jobbers to conform with recent changes in mill prices. The new quotations are carried under the appropriate paragraphs.

Structural Material.—Building activity remains in full swing, but fabricators are finding it increasingly difficult to cover their needs in plain material. Local mills likewise are heavily committed. Prices are no longer the chief concern of the buyer. His difficulty lies in finding a mill which will accept his order.

The mill quotation on plain material is 2.35c. to 2.40c., Chicago. Jobbers quote 3.05c. for plain material out of warehouse.

Reinforcing Bars.—Awards are less numerous than for several weeks, but this momentary lull in buying is not regarded significant in view of the large tonnage pending. Sellers are showing increasing concern about deliveries from the mills which, because of the over-loaded condition of their books, are able to give customers only a portion of their requirements. Recent advances in mill prices are expected to result in a further rise in warehouse prices. In fact, one prominent dealer has announced an advance to 3c., Chicago warehouse, and it is likely that others will be up to that figure within a week or two. Lettings include:

Bailey Apartments, Chicago, 500 tons to Truscon Steel Co.
Michael Reese Hospital addition, Chicago, 230 tons to Joseph T. Ryerson & Son.

University of Minnesota storehouse and shop, Minneapolis, Minn., 150 tons to Concrete Steel Co.

Pending work includes:

Commodore Hotel, Chicago, 325 tons.
Lowe Theater and office building, St. Louis, 275 tons.
Peoples Gas Light & Coke Co., Homan Avenue shop addition, Chicago, 175 tons.
Pettit storage warehouse, Fort Wayne, Ind., 125 tons.
Winnebago County, Wis., road work, 100 tons.

Coke.—Local by-product foundry coke is still quoted at \$15, delivered Chicago switching district, but the output of ovens has been hampered by a shortage of coking coal, and melters are finding it necessary to seek larger quantities of coke from outside sources. Connellsburg foundry is selling at all the way from \$8 to \$9, ovens, the freight to Chicago being \$4.16. Southern by-product foundry is bringing \$8.50, Birmingham, or \$12.79, Chicago.

Old Material.—The market is exceedingly strong, and prices have advanced from 50c. to \$1.50 a ton. There has been some additional buying of basic open hearth grades, malleable and cast scrap, as well as miscellaneous grades, but consumptive purchases are limited, not because of the disinclination of buyers, but on account of a shortage of material. Railroad offerings have been somewhat heavier, but far short of current demand. The inflow of country scrap is small. In fact, dealers are having difficulty in filling their short sales without taking on new obligations. Lists include: The Pennsylvania Southwestern Region, 3400 tons; the Burlington, 4600 tons; the Chicago surface lines and the Monon, 1000 tons each, and the Big Four a blind list.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$26.00 to \$26.50
Cast iron car wheels	27.50 to 28.00
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Rolled or forged steel car wheels	27.50 to 28.00
Rails for rolling	23.00 to 23.50
Steel rails, less than 3 ft.	25.00 to 25.50
Heavy melting steel	22.00 to 22.50
Frogs, switches and guards cut apart	22.00 to 22.50
Shoveling steel	21.50 to 22.00
Drop forge flashings	18.50 to 19.00
Hydraulic compressed sheets	19.00 to 19.50
Axle turnings	19.50 to 20.00

Per Net Ton	
Iron angles and splice bars	25.50 to 26.00
Steel angle bars	21.75 to 22.25
Iron arch bars and transoms	25.50 to 26.00
Iron car axles	28.50 to 29.00
Steel car axles	24.00 to 24.50
No. 1 busheling	18.00 to 18.50
No. 2 busheling	13.50 to 14.00
Cut forge	19.00 to 19.50
Pipe and flues	16.00 to 16.50
No. 1 railroad wrought	19.50 to 20.00
No. 2 railroad wrought	19.50 to 20.00
Steel knuckles and couplers	25.00 to 25.50
Coil springs	25.00 to 25.50
No. 1 machinery cast	24.50 to 25.00
No. 1 railroad cast	23.50 to 24.00
No. 1 agricultural cast	23.50 to 24.00
Low phos. punchings	21.00 to 21.50
Locomotive tires, smooth	21.50 to 22.00
Machine shop turnings	14.00 to 14.50
Cast borings	15.50 to 16.00
Short shoveling turnings	15.50 to 16.00
Stove plate	22.00 to 22.50
Grate bars	21.00 to 21.50
Brake shoes	21.00 to 21.50
Railroad malleable	24.50 to 25.00
Agricultural malleable	24.50 to 25.00

Detroit Scrap Advances

DETROIT, Feb. 27.—The recent letting by one of the largest producers in this district on approximately 3500 tons of borings, turnings, flashings and regular hydraulic compressed for March delivery established peak prices. Bids were confined mostly to dealers. Sales on automobile cast have been recorded as high as \$30 per net ton.

The following prices are on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, automobile and No. 1 machinery cast, which are quoted on a net ton basis:

Heavy melting steel	\$21.50 to \$23.00
Shoveling steel	21.50 to 23.00
No. 1 machinery cast	25.00 to 27.00
Cast borings	16.00 to 17.00
Automobile cast scrap	28.00 to 30.00
Stove plate	19.00 to 21.00
Hydraulic compressed	17.00 to 18.00
Turnings	15.50 to 16.75

New York

Many Sales of Pig Iron Foot Up 40,000 Tons— More Price Advances

NEW YORK, Feb. 27.—Sales of pig iron during the past week for second quarter delivery have amounted to fully 40,000 tons, made up largely of rather small tonnages. The largest purchase was about 10,000 tons by the Central Foundry Co. for its various plants. Other sales ranged from 1000 tons down to a few carload lots. One agency sold 16,000 tons made up of 35 orders. The general activity of buyers indicated a belief that prices are likely to advance. Most of the buying was done on a basis of \$28, eastern Pennsylvania furnace, for No. 2 plain and \$29 now seems to be the minimum in that territory, while in Buffalo \$28 is the prevailing quotation. Little is heard of foreign iron except that shipped from a considerable stock held at Boston which, owing to the almost complete isolation of the New England district because of railroad embargoes, is being delivered in that territory rather freely. Competent authorities assert that no pig iron can be bought from any foreign country and delivered in this country now for less than \$32. No fear is entertained of any future competition from foreign irons in the near future.

Coal and Coke.—Following the slight softening in the coke market noted last week, a firmer tendency is noted. This is attributed to the inquiries which have been received from furnaces whose owners are considering blowing them in soon. Furnace coke is quoted at \$7 to \$7.50, with \$7.25 prevailing, while foundry coke ranges from \$8 to \$8.50. By-product coke continues to be quoted at \$14.84 to \$14.91, Newark and New Jersey points.

We quote delivered in the New York district as follows, having added to furnace prices \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$33.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	32.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	31.27
Buffalo, sil. 1.75 to 2.25.....	\$32.41 to 32.91
No. 2X Virginia, sil. 2.25 to 2.75.....	33.44
No. 2 Virginia, sil. 1.75 to 2.25.....	32.44

Ferroalloys.—Sales of about 1500 to 2000 tons of British ferromanganese are reported to have been made last week at the new price of \$110, seaboard, duty paid. Nothing is heard in this market of sales made by domestic producers nor their attitude as to price, but it is believed that any business done by them would be at not less than \$110, furnace. They have not, however, changed their official quotation of \$107.50, furnace. One or two representatives of large British producers have been instructed to sell no more ferromanganese for shipment from England after July 1, all the alloy which they can ship between now and then having been sold. Demand in general is not heavy. The spiegel-eisen market is quiet, with sales confined to carload and small lots at regular quotations. The 50 per cent ferro-silicon market is exceedingly strong, with one producer quoting a minimum of \$90, delivered. There are substantial inquiries and it also develops that specifications on contracts are not only very heavy, but some consumers have already used up their 1923 contract requirements. The ferrochromium market is quiet at 12c. to 14c. per lb. of contained chromium, delivered.

Warehouse Business.—Demand is strong for practically all products carried in stock. In some materials, such as spring steel, an increasing shortage of some sizes is noted by warehouses, which are receiving orders from other dealers, whose stocks are depleted. Sales of bars and plates are still large, but there is a gradual increase in the volume of inquiry for structural material. Sheet prices are firmer, one of the factors in the sheet market in this district having increased quotations on both black and galvanized sheets by 25c. per 100 lb. Despite this and greater difficulty in obtaining shipments from mills, there is still a tendency to shade, so that a fair estimate of the market is 4.35c. to 4.75c. per lb. on black sheets and 5.35c. to 5.75c. per lb. on galvanized sheets. An increase in prices on

most products is expected before long in view of the strong condition of mill prices. Brass and copper warehouses, which reported increases in price on Feb. 12 and 17, report another rise on Feb. 21 of $\frac{1}{4}$ c. to $\frac{1}{2}$ c. per lb. on brass and $\frac{3}{4}$ c. per lb. on copper products. We quote prices on page 662.

Cast-Iron Pipe.—Both private purchases and municipal tenders are numerous. Prices are firm. The recent tender of the City of Boston calling for about 1500 tons of 60-in. water pipe was awarded to the Warren Foundry & Pipe Co. Buffalo will open bids on March 5 on about 600 tons of water pipe. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$56.50; 4-in. and 5-in., \$61; 3-in., \$66.80, with \$4 additional for Class A and gas pipe. Although buying of soil pipe by jobbers continues heavy, there is a good demand out of stock, and stocks are still far from full, particularly in the New England district, where railroad embargoes and the weather have prevented shipments. We quote discounts of both Southern and Northern makers, delivered New York, as follows: 2 to 6-in. standard, 18 to 20% per cent off list; heavy, 28 to 30% per cent off list.

Finished Iron and Steel.—Further price advances on plates, shapes and bars by Eastern mills have brought the minimum close to 2.85c., Pittsburgh. So far as could be learned today only one independent mill was still quoting 2.25c., Pittsburgh. At least Eastern companies are now quoting 2.50c., Pittsburgh, as a minimum on plates and one large producer is quoting the same price for shapes and bars. The pressure to get orders on the books of the mills has let up to some extent, probably due to the fact that so many buyers have covered during recent weeks for as far ahead as they could anticipate their requirements. It is stated by mill representatives that there has been very little buying except for specific work. The mills have been very careful in taking tonnage to avoid duplication of orders and in most instances are requiring information as to the work for which the steel is intended. Demand for concrete reinforcing bars keeps up fairly well, although a large number of builders have gotten under cover since the first of the year. About 4000 tons for the Jamaica Bay causeway will probably be let this week; 2500 tons for a terminal warehouse at Cincinnati is also up for bids. For a stadium at Wittenburg College, Springfield, Ohio, 1000 tons is required. The Concrete Steel Co. has taken 400 tons for road work near Buffalo and 200 tons for a storage building in Philadelphia. Several large structural jobs which have not yet come into the market are being talked of, including a Presbyterian Hospital in New York, which will take 18,000 to 20,000 tons; a building for William Randolph Hearst at Broadway and Fifty-ninth Street, New York, 8000 tons, and the Savoy Hotel, 2000 tons. A hotel building to be erected on the site of the New York Hippodrome has not become an active project so far as the steel market is concerned.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, plates and structural shapes, 2.44c. to 2.59c.; bar iron, 2.44c. to 2.49c.

Old Material.—Prices are still strong with an upward tendency, but shipments from this district are not heavy at present because of inability of dealers to obtain material. With an improvement in the weather an increase in shipments of steel from New England is expected, but probably not a sufficiently large tonnage to affect prices materially, in view of the strong market on new material. About \$23.50 per ton is being paid on No. 1 heavy melting steel for Midland, Monessen and Steubenville and about \$22 for delivery to Claymont, Del., Pottstown and Coatesville, Pa. For shipment to Bethlehem, \$22 per ton is now being paid for railroad quality of heavy melting steel and on a tonnage of strictly railroad quality it is believed even a better price than this could be obtained. A fair range of the prices paid in New York is \$18 to \$18.50 for No. 1 and \$19 to \$19.50 for railroad quality of heavy melting steel. On locomotive grate bars \$19 Harrisburg and Phoenixville is offered. Both Harrisburg and Mahwah, N. J., shipments on stove plate bring \$19.50, but the

difference in freight rate is considerable. For shipment to Bethlehem, borings and turnings are worth \$18 per ton, while \$18.25 would be paid for shipment to Harrisburg and Phoenixville. Specification pipe is worth about \$19 or more per ton, delivered to Lebanon or Columbia, Pa.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$18.00 to \$18.50
Steel rails, short lengths, or equivalent.....	19.00 to 19.50
Rails for rolling.....	20.00 to 20.50
Relaying rails, nominal.....	29.00 to 30.00
Steel car axles.....	22.00 to 22.50
Iron car axles.....	28.00 to 29.00
No. 1 railroad wrought.....	20.00 to 21.00
Wrought iron track.....	18.50 to 19.50
Forge fire.....	15.00 to 15.50
No. 1 yard wrought, long.....	18.00 to 19.00
Cast borings (clean).....	15.50 to 16.00
Machine-shop turnings.....	15.00 to 15.50
Mixed borings and turnings.....	15.00 to 15.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	15.00 to 15.50
Stove plate.....	16.50 to 17.50
Locomotive grate bars.....	17.00 to 18.00
Malleable cast (railroad).....	20.00 to 21.00
Cast-iron car wheels.....	20.00 to 22.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast.....	\$22.50 to \$23.50
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	19.50 to 20.50
No. 1 heavy cast, not cupola size.....	17.50 to 18.50
No. 2 cast (radiators, cast boilers, etc.).....	18.00 to 19.00

Birmingham

Heavy Buying of Pig Iron—Some Companies Advance Prices

BIRMINGHAM, ALA., Feb. 27.—Pig iron sold in heavy tonnage last week and at the close there was nervous tendency to an advance over the \$25 base. One maker operating one stack and out of market for the first half is on base of \$27 for third quarter and has sold several lots of meager tonnage. Another maker out of first half market and selling for third quarter has booked 20,000 tons at \$25 uniformly. This is the only price charged last week with the exception of the isolated instance mentioned. Next to the largest merchant interest withdrew from the market for all grades and all deliveries toward the end of the week after making large sales. One maker booked 15,000 tons, another 20,000 to 30,000 and a third about 25,000 tons. The week's business, it is believed, approximated 75,000 tons with lots ranging from 100 tons to 2000 and even higher. Chicago, Cincinnati, St. Louis, Boston and New York were among the takers. The Pacific Coast reappeared in the market and placed 1500 tons for remainder of second half. High silicones took full differentials. One lot of 3.75 to 4.25 silicon consisting of 500 tons brought \$27. The embargo on Louisville and north of that point declared by the Louisville & Nashville affected shipments to a degree. Southern pipe shops have been heavy buyers and heating apparatus makers North and South have also bought much iron. The available unsold tonnage for first half is uncomfortably small and Southern melt is heaviest on record.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$25.00
Basic.....	24.00
Charcoal, warm blast.....	33.00

Finishing Mills.—"It is a strain on capacity," said a leading wire mill operator. That applies to the Tennessee Company, the Gulf States Steel Co., the American Steel & Wire Co. and the Conners Steel Co. The strain applies alike to delivery and production. Steel bars have advanced to 2.50c, f.o.b. Birmingham. The Atlanta Steel Co has shipped 500 tons of product to Cuba.

Cast Iron Pipe.—The pressure pipe market is almost without parallel. The United States Cast Iron Pipe and Foundry Co. booked 1300 tons of 30-in. for Memphis and 50,000 ft. of 6 to 24-in. for Beaumont, Tex. The base is a minimum of \$45 to \$46 for 6 to 14 in. Sanitary pipe orders are fairly large in spite of capacity plant bookings. The new base of \$70 is reported as generally applying.

Coal and Coke.—Birmingham shipped 3500 tons of coke to San Antonio, Chile, last week. Spot foundry

brings \$8.50 and higher. Production and demand are at maximum.

Old Material.—The scrap market is on verge of an advance and small buyers are paying more than quoted prices, but inability of the dealers to ship far afield on account of freight rates acts bearishly on old material.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$16.00 to \$17.00
No. 1 steel.....	14.00 to 16.00
No. 1 cast.....	18.00 to 20.00
Car wheels.....	18.00 to 20.00
Tramcar wheels.....	17.00 to 19.00
Stove plate.....	16.00 to 17.00
Cast-iron borings.....	9.00 to 10.00
Machine shop turnings.....	9.00 to 10.00

Boston

Material Increase in Pig Iron Sales with Stiffer Prices Following

BOSTON, Feb. 27.—Sales of pig iron in this territory were fairly heavy the past week. One textile machinery maker bought 2000 tons No. 2X, half Southern and half French, while two heater manufacturers took approximately 5000 tons No. 2 plain, details about which are lacking, all second quarter delivery. These sales, with a large number of tonnages ranging from car lots to 500 tons, practically all second quarter shipment, brought the total to rising 10,000 tons. Most small lots consisted of No. 2X and No. 1X eastern and western Pennsylvania, Virginia, Alabama and Buffalo, and the equivalent in Scotch and Continental. Foreign iron business, however, was comparatively small because of limited supplies available. Eastern Pennsylvania sold at \$28, furnace base, western Pennsylvania and Buffalo at \$27.50 to \$28 base, with some slight modifications on differentials on No. 1X, Virginia at \$27 base, Alabama at \$26 base, Northern malleable at \$29 base Buffalo, Scotch, silicon 2.50 plus, at around \$33 on dock plus and minus duty; English high manganese and low phosphorus at about \$1 a ton less, and Continental at around \$30 on dock plus and minus duty for silicon 1.80 to 2.50, and \$1 more for silicon 2.50 to 3.00. Now, enough eastern Pennsylvania furnaces have gone to \$29 furnace base with \$1 differentials to establish that market; Buffalo at less than \$28 is eliminated; Scotch, English and Continentals are up \$1, and lake charcoal up \$1.50 to \$31.50, furnace base.

We quote delivered prices on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia and \$9.60 from Alabama:

Eastern Penn., sil. 2.25 to 2.75.....	\$33.65
Eastern Penn., sil. 1.75 to 2.25.....	32.65
Buffalo, sil. 2.25 to 2.75.....	\$33.41 to 33.91
Buffalo, sil. 1.75 to 2.25.....	32.91
Virginia, sil. 2.25 to 2.75.....	33.42 to 34.42
Virginia, sil. 1.75 to 2.25.....	32.92 to 33.92
Alabama, sil. 2.25 to 2.75.....	35.10 to 36.10
Alabama, sil. 1.75 to 2.25.....	34.60 to 35.60

Warehouse Business.—Cold-rolled steel has been advanced \$3 a ton, and the market on other kinds is strong. Milder weather has released a considerable tonnage of iron and steel held up, while current business shows expansion. The movement out of warehouse stocks is larger than at any previous time this year. Higher prices demanded for wire nails from some mills suggests an advance in warehouse prices before long.

Jobbers quote: Soft steel bars, \$3.21 $\frac{1}{4}$ per 100 lb. base; flats, \$4; concrete bars, \$3.36 $\frac{1}{4}$; structural steel, \$3.21 $\frac{1}{4}$ to \$3.65; tire steel, \$4.65 to 55; open-hearth spring steel, \$5 to \$6.50; crucible spring steel, \$12; steel bands, \$4.40; hoop steel, \$4.90; cold rolled steel, \$4.30 to \$4.80; refined iron, \$3.21 $\frac{1}{4}$; best refined, \$4.50; Wayne iron, \$5.50; Norway iron, \$6.60 to \$7.10; plates, \$3.31 $\frac{1}{4}$ to \$3.53 $\frac{1}{4}$; No. 10 blue annealed sheets, \$4.21 $\frac{1}{4}$ per 100 lb. base; No. 28 black sheets, \$5.40; No. 28 galvanized sheets, \$6.40.

Coke.—New England made by-product foundry coke continues at \$15 to \$16 delivered within the \$3.10 freight rate zone. One producer is reported to have increased contract shipments, while the other has fallen further behind, due to emergency calls for domestic fuel. Connellsville foundry coke is offered at slightly lower prices, the general range being \$13.80 to \$14.55 delivered, or \$8.25 to \$9 ovens. Comparatively little busi-

ness was placed the past week, but increased shipments on permits on outstanding contracts are reported.

Old Material.—A further general stiffening in old material prices is visible with a somewhat diminished volume of business passing. Dealers, generally, are carrying a heavy tonnage of unshipped material on their books, due to the slowness of railroads in placing cars for loading. For this reason they are backward about committing themselves further until the transportation situation is clearer. Inquiries continue heavy. Fancy prices were paid the past week for machinery cast, due to the inability to dig out material in consuming localities and distant points of shipments. One lot of 500 tons sold at \$25.90 delivered, which netted the shipper \$22.40. Other sales are reported at \$26.50, and still others as high as \$27 delivered, which figure back to about \$23.50 loading point. For shipment with ordinary freights the market on No. 1 machinery cast is \$24.50 to \$25.50, \$1 higher.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	\$24.50 to 25.00
No. 2 machinery cast	22.50 to 23.50
Stove plate	19.00 to 19.50
Railroad malleable	24.50 to 25.00
Car wheels	22.50 to 23.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$17.50 to \$18.00
No. 1 railroad wrought	19.50 to 20.00
No. 1 yard wrought	17.50 to 18.00
Wrought pipe (1 in. in diam., over 2 ft. long)	15.00
Machine shop turnings, regular	13.75 to 14.00
Cast iron borings, rolling mill	14.50 to 15.00
Cast iron borings, chemical	19.00 to 19.50
Blast furnace borings and turnings	13.00 to 13.50
Forged scrap and bundled skeleton	14.00 to 14.50
Street car axles	21.50 to 22.00
Shafting	21.50 to 22.00
Rails for rolling	19.50 to 20.00

Cincinnati

Pig Iron Prices Firm with Numerous Sales of Moderate Tonnages

CINCINNATI, Feb. 27.—While a number of fair-sized sales were made last week, activity generally was confined to the smaller buyers, and sales running from a carload to 300 tons aggregated a fairly large total. Prices are very firm, and southern Ohio furnaces advanced prices \$1 a ton on Tuesday. There was a small tonnage of resale iron on the market, however, but this has all been disposed of at \$28.50, and the market now is strong at \$29, Ironton. In the South, few changes have been made in quotations, with the exception that some furnaces have withdrawn for second quarter and have named \$26 to \$27 as a third quarter price. The market, however, remains at \$25, Birmingham, for first and second quarters. A fair demand for silvers is reported and it is almost certain that prices will be advanced within the next week or two. Basic iron is reported to be very scarce. The larger sales reported last week include 2000 tons of foundry to a gas engine manufacturer, 1000 tons to a central Ohio melter, 2000 tons to a radiator company, and 500 tons to a Hamilton melter. Most of these sales, made early in the week, were at \$28, Ironton, with one at \$28.50. A sale of 2000 tons of foundry iron is reported to have been made by a Valley furnace to a central Ohio melter at \$27.75, furnace. We also note a sale of 1100 tons of silvery at the schedule, and 3000 tons of malleable to a Michigan motor car manufacturer at around \$30, lake furnace. Inquiry is light, the L. & N. Railroad being in the market for 1000 tons and a number of others for smaller amounts.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sll. 1.75 to 2.25 (base)	\$29.05
Southern Coke, sll. 2.25 to 2.75 (No. 2 soft)	29.55
Ohio silvery, 8 per cent.	38.77
Southern Ohio coke, sll. 1.75 to 2.25 (No. 2)	31.27
Basic Northern	29.77
Malleable	31.27

Finished Materials.—Some independent companies have opened books for second quarter on bars, shapes and plates at 2.25c., and are now about filled, most of the tonnage having been reserved some time ago. Allo-

cation of tonnage based on first quarter contracts is now being done generally. Further advances in sheet prices by some mills are reported, and 3c., 4c. and 5c. for blue annealed, black and galvanized sheets respectively have been done in a small way for quick delivery. Wire products are in brisk demand, with quotations ranging from \$2.80 to \$3 for nails, and \$2.65 to \$2.90 on plain wire. Great activity prevails in the building industry, and a number of awards were reported. The largest of these was the Neil House, Columbus, Ohio, 5000 tons, which was awarded to the Mt. Vernon Bridge Co. The War Memorial Building at Nashville, Tenn., 900 tons, has been awarded to the Nashville Bridge Co. A number of other awards, running around 100 to 200 tons, also were made. Reinforcing bars are also in heavy demand. The Temple Bar Building, Cincinnati, taking 8000 tons of bars, will likely be awarded this week. Action also is expected on the plant of the Central Warehouse & Refrigeration Co., involving 800 tons. New inquiries for structural steel include an assembling plant for the Ford Motor Co., at Atlanta, Ga., requiring 425 tons.

Warehouse Business.—Local jobbers report a big demand for bars, shapes and plates for quick delivery. Included among orders booked is one for 220 tons of shapes required for a building in southern Indiana. Wire products are in good demand for future shipment, with indications of advancing prices. It is expected that prices of sheets will be advanced \$5 per ton within a week or ten days, as mill prices have advanced sharply, with no corresponding increase in warehouse prices.

Cincinnati jobbers quote: Iron and steel bars, 3.10c.; reinforcing bars, 3.20c.; hoops, 4.30c.; bands, 3.85c.; shapes, 3.20c.; plates, 1/4-in. and heavier 3.20c., lighter 3.35c.; cold-rolled rounds, 3.90c.; cold-rolled flats, squares and hexagons, 4.40c.; No. 10 blue annealed sheets, 4c.; No. 28 black sheets, 4.70c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, \$3.30 per 100 lb.; common wire nails, \$3.30 per keg, base.

Coke.—Foundry coke is active, but little interest is shown in domestic and furnace grades. Prices are holding up well. Connellsburg coke price remained unchanged. New River foundry has sold at \$14 for spot shipment, and second quarter contracts are being negotiated at \$12. Wise County foundry is down 50c. to \$8.50. Southern by-product fuel is quoted at \$8.75 to \$9. By-product prices in this district are unchanged at \$11, Connellsburg basis.

Old Material.—The scrap market is showing a fair amount of activity, with prices still tending upward. Two steel companies in this district have been buying in a small way, and foundry grades have also been in much better demand. Cast scrap is scarce, and has sold as high as \$25 a net ton.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

	Per Gross Ton
Bundled sheets	\$16.50 to \$17.00
Iron rails	19.50 to 20.00
Relaying rails, 50 lb. and up	28.50 to 29.50
Rails for rolling	21.00 to 21.50
Heavy melting steel	20.50 to 21.00
Steel rails for melting	19.50 to 20.00
Car Wheels	24.00 to 24.50

	Per Net Ton
No. 1 railroad wrought	18.00 to 18.50
Cast borings	15.00 to 15.50
Steel turnings	14.50 to 15.00
Railroad cast	21.00 to 21.50
No. 1 machinery cast	23.00 to 23.50
Burnt scrap	15.00 to 15.50
Iron axles	26.00 to 26.50
Locomotive tires (smooth inside)	18.50 to 19.00
Pipes and flues	15.50 to 16.00

In order to complete negotiations for a site for a steel plant to be built by the Jones & Laughlin Steel Corporation, the East Chicago Land Co. of Lake County, Ind., recently offered Robert Bracken, auditor, State of Indiana, \$375 an acre or a total of \$105,750 for 282 acres of partly submerged land in the basin of Lake George in the city of Hammond, to which the State claims title. Previously the land company had offered \$100 an acre. The Jones & Laughlin company will acquire the land as soon as the title to it is clear. It was sold, but the land company could not give a clear title; hence the above offer.

Cleveland

Pig Iron Active with Prices Advancing—Dock Ore Is Resold

CLEVELAND, Feb. 27.—Increased furnace operations have resulted in increased demand for dock ore, and during the week one lot of 50,000 tons of Bessemer ore was resold subject to 1923 prices. Previously some dock ore had been moved at last season's prices, but with the expected advance in ore prices, the owner of the Bessemer ore refused to sell it at last year's prices, which doubtless would have meant paying a higher replacement price this season. Some other inquiries for dock ore are pending, including one for 3000 tons of manganiferous ore. While a rather early establishment of prices for this year has been expected, some of the ore companies would prefer to have the opening of the market hold out for some time so that they can get a better line up on their mining costs. The Interstate Commerce Commission is expected to render a decision in the ore rate case before the opening of the season of navigation, but if this decision is not handed down before the buying movement starts, sellers will probably add riders to their ore contracts that would give the buyers the benefit of any reductions in the rail rates from the mines to the upper lake docks. Considerable foreign ore has been sold in the East recently, and prices on this ore have stiffened. This advance is attributed to the increased demand from the English furnaces, the activity of which is reported to have been stimulated from a demand from Germany for pig iron because German production has been curtailed for lack of coal from the Ruhr district. However Lake Superior ore producers see little chance to sell standard ore in the East this year in competition with foreign ores, and their Eastern sales will be confined largely to manganiferous. For prices, see page 642.

Pig Iron.—The market continues active and prices still show an upward tendency. Locally foundry iron has advanced 50c. a ton to \$30 at furnace at which small lot sales have been made, although little Cleveland made iron is now being offered. The Detroit price has advanced to \$31, at which lots up to 700 tons have been sold. One producer who recently went on a \$30 basis has made no further advance, and during the week sold over 10,000 tons of foundry and malleable iron, including a 3500-ton and a 2500-ton lot. Valley furnace prices also have stiffened, some makers now quoting from \$28.50 to \$29, and sales in small lots have been made at the latter price. There is still considerable second quarter buying in Michigan, Indiana and western Ohio. Iron has been shipped into the Michigan territory from both Buffalo and southern Ohio. At present it evidently can be delivered at some Michigan points from Buffalo at about the same prices as if purchased from nearby furnaces. More inquiry has come out for third quarter contracts. These include 6000 tons, 2000 tons and 1500 tons of malleable and foundry iron, on which sellers have not yet decided to quote. The supply of basic iron appears to be becoming rather short. A Cleveland melter is in the market for 2000 tons, and a Pittsburgh broker is inquiring for 5000 tons. New second quarter inquiries that developed during the week include the following for foundry iron except where otherwise designated: Westinghouse Electric & Mfg. Co., 2250 tons for Trafford City, and 3100 tons for Cleveland; General Electric Co. 1100 tons of foundry and 800 tons of malleable for Erie; New York Central Railroad 1100 tons for Elkhart; Detroit Brass & Malleable Works, Detroit, 800 tons of malleable iron, and Excelsior Stove & Mfg. Co., Quincy, Ill., 1900 tons. The activity of the automobile foundries has stimulated a demand for silvery iron. Two local sales are reported each of 500 tons for second quarter at schedule prices. Southern foundry iron is firm at \$25 Birmingham, and fairly active in small lot sales.

Low phosphorus iron is unchanged at \$35, Valley

furnace, for copper free iron. Sales of 1500 tons are reported at that price.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron includes a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and a \$6 rate from Birmingham:

Basic, Valley furnace	27.00
Northern No. 2 fdy., sil. 1.75 to 2.25	\$30.00 to 30.50
Southern fdy., sil. 1.75 to 2.25	31.00
Malleable	30.00
Ohio silvery, 8 per cent.	39.00
Standard low phosph., Valley furnace	35.00

Semi-Finished Steel.—Inquiry is heavy, particularly for sheet bars both for prompt shipment and for the first quarter, but no sales are reported. A local mill which has been out of the market for some time expects to open its books for the second quarter in a few days. Sellers' price talk on sheet bars ranges from \$42.50 to \$47.50. An Eastern mill is quoting forging billets at \$50 at mill.

Finished Iron and Steel.—Although the market is not so active as a few weeks ago, there is still considerable inquiry, but the supply of steel is very scarce except for extended deliveries. Several independent mills are virtually out of the market and others are taking only a portion of the tonnage offered. Buyers are crowding the mills for shipments. On steel bars, plates and structural material, 2.25c. is still the minimum quotation. Plates are in good demand in small lots and Eastern mills have further advanced prices to 2.55c. at mill for deliveries in from one to two months. A local mill continues to quote tank plates at 2.65c., Pittsburgh. The sale of a round tonnage of tank plates is reported to a Valley district consumer by an Eastern mill at 2.35c., this being made before the last advance. A local mill is quoting steel bars for early shipment at 2.75c. to 3c., the higher price for forging quality, and a Pittsburgh district mill is asking 2.55c. for bars. A railroad company is inquiring for 1000 70-ton, flat bottom gondola cars requiring 20,000 tons of plates and shapes and an inquiry has come out for 10,000 tons of plates for the Catskill Aqueduct. In the building field, a good volume of structural steel work continues to come out.

Jobbers quote steel bars, 3.06c.; plates and structural shapes, 3.16c.; No. 9 galvanized wire, 3.30c.; No. 9 annealed wire, 2.80c.; No. 28 black sheets, 4.40c.; No. 28 galvanized sheets, 5.40c.; No. 10 blue annealed sheets, 3.65c. to 3.76c.; cold-rolled rounds, 3.90c.; flats, square and hexagons, 4.40c.; hoops and bands, 1 in. and wider and No. 20 gage or heavier, 3.84c.; narrower than 1 in. or lighter than No. 20 gage, 3.36c.

Sheets.—Some independent mills have further advanced prices and their present quotations are well above the new prices of the American Sheet & Tin Plate Co. The common quotations by independent mills are 3.60c. for black, 4.75c. for galvanized and from 2.75c. to 3c. for blue annealed sheets. Some independent mills are taking orders for April shipment, but not for the second quarter. The Ford Motor Co. is understood to have placed a round tonnage of automobile frame stock with a Youngstown mill for the second quarter. A Cleveland mill expects to close this week for its second quarter output of automobile body sheets and announces that its price will be not less than 5.35c. and possibly 5.50c.

Reinforcing Bars.—Rail steel bars have advanced \$3 a ton to 2.25c. These are in good demand for building and highway work and also for manufacturers of various hand tools. The Concrete Steel Co. has taken 350 tons for a factory building for the General Fire Extinguisher Co., Warren, Ohio.

Bolts, Nuts and Rivets.—The bolt and nut market is very firm and makers are predicting an early advance in the published discounts. It seems probable that these discounts will be made the basis of second quarter contracts. Rivet prices are unchanged at 3c. for structural and 3.10c. boiler rivets.

Coke.—Foundry coke is unchanged at \$8.50 to \$9 for standard Connellsburg makes. There is a fair demand for small lots.

Old Material.—The market continues very strong with further price advances on a number of grades. The sale of a round tonnage of heavy melting steel to a Cleveland mill is reported at \$24, or an advance of

\$1 over the price paid by a local mill during the previous week. Some other buying in small lots is being done by mills, and there is considerable activity among dealers. Both cast borings and mixed borings and short turnings are in good demand. Cast scrap is still scarce. In the Valley district, dealers are asking as high as \$26 for heavy melting steel, and a dealer has paid \$25.50 to cover on a short order.

We quote per gross ton, f.o.b. Cleveland, as follows.

Heavy melting steel.....	\$22.75 to \$23.25
Rails for rolling.....	25.00 to 26.00
Steel rails under 3 ft.....	24.00 to 25.00
Iron rails.....	22.00 to 22.50
Iron car axles.....	27.00 to 28.00
Low phosphorus melting.....	24.00 to 24.50
Cast borings.....	19.00 to 19.25
Machine shop turnings.....	17.50 to 18.00
Mixed borings and short turnings.....	18.25 to 18.50
Compressed steel.....	19.50 to 20.00
Railroad wrought.....	21.00 to 21.50
Railroad malleable.....	24.50 to 25.00
Light bundled sheet stampings.....	18.00 to 18.25
Steel axle turnings.....	20.00 to 20.50
No. 1 cast.....	24.00 to 26.00
No. 1 busheling.....	17.75 to 18.25
Drop forge flashings over 10 in.....	16.50 to 16.75
Drop forge flashings under 10 in.....	16.75 to 17.25
Railroad grate bars.....	19.50 to 20.50
Stove plate.....	19.50 to 20.50
Pipes and flues.....	17.50 to 17.75

St. Louis

Two Large Makers of Southern Pig Iron Withdraw from the Market

ST. LOUIS, Feb. 27.—The most important development of the week in the pig iron situation was the withdrawal from the market of two large makers of iron in the Birmingham district. This has caused a material stiffening of the market for Southern iron, one company advancing its quotations to \$27, Birmingham. The lowest quotation now known is \$25. Heavy buying of iron by pipe manufacturers for second quarter is believed to be the cause of the withdrawal of makers from the market. Northern iron is strong at \$30, Chicago, with Granite City quoting \$30.50 to \$31.50, f.o.b. furnace. There has been an increase in inquiries, and melters are giving more attention to second quarter requirements. An Indiana melter is in the market for from 2000 to 3000 tons of malleable. Makers are well sold up, and it is difficult to get orders placed or shipments through.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago, \$3.28 from Birmingham (rail and water), \$5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern fdv., sil. 1.75 to 2.25...	\$32.16
2.25	32.16
Basic	32.16
Southern fdv., sil. 1.75 to 2.25...	\$30.17 to 32.17

Finished Iron and Steel.—The heavy demand for finished iron and steel continues. Inquiries are coming from all branches of the industry. Manufacturers and jobbers insist that they really have booked orders covering inquiries and are not indulging in speculative buying. Mills are overwhelmed with business. The concern mentioned in last week's IRON AGE as having received inquiries from customers in this territory for 25,000 tons of structural steel was unable to allocate 5000 tons to cover these inquiries. The United Iron Works of Kansas City has been inquiring for 6000 tons of tank steel covering the requirements for tanks of the Sinclair Oil Co. The Missouri-Kansas-Texas Railway is in the market for six months' requirements for axles, 200 tons. A St. Louis line bought 250 tons of wheels, and a Texas line bought the same quantity.

For stock out of warehouse we quote: Soft steel bars, 3.05c. per lb.; iron bars, 3.05c.; structural shapes, 3.15c.; tank plates, 3.15c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 4.05c.; structural rivets, 3.85c. per 100 lb.; boiler rivets, 3.95c.; tank rivets, $\frac{1}{8}$ in. and smaller, 55 per cent off list; machine bolts, large, 50 per cent; smaller, 50 per cent; carriage bolts, large, 45 per cent; small, 45 per cent; lag screws, 55 per cent; hot pressed nuts, square or hexagon blank, \$2.75; and tapped, \$2.75 off list.

Coke.—There is a very strong inquiry for domestic coke, due to the continued cold weather. The Granite

City producer is still making only domestic grades. Foundry coke is in short supply, with a heavy demand.

Old Material.—The market is very short of old material. A typical example is that of a local dealer who has been getting an average of only three cars a day against purchase of 18,000 tons from country dealers, whose stocks of prepared scrap are exhausted. Mills are needing material. No railroad lists are out.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

	Per Gross Ton
Iron rails	\$21.50 to \$22.00
Rails for rolling	22.50 to 23.00
Steel rails, less than 3 ft.....	23.00 to 23.50
Relaying rails, standard section ..	31.00 to 33.00
Cast iron car wheels	28.50 to 29.00
Heavy melting steel.....	20.00 to 20.50
Heavy shoveling steel.....	19.50 to 20.00
Frogs, switches and guards cut apart	21.50 to 22.00

	Per Net Ton
Heavy axles and tire turnings ..	15.00 to 15.50
Steel angle bars	20.00 to 20.50
Iron car axles	28.50 to 29.00
Steel car axles	23.50 to 24.00
Wrought iron bars and transoms ..	24.00 to 24.50
No. 1 railroad wrought	18.00 to 18.50
No. 2 railroad wrought	18.50 to 19.00
Railroad springs	24.50 to 25.00
Steel couplers and knuckles ..	24.50 to 25.00
Cast iron borings	14.00 to 14.50
No. 1 busheling	16.00 to 16.50
No. 1 railroad cast	22.00 to 22.50
No. 1 machinery cast	22.50 to 23.00
Railroad malleable	21.75 to 22.25
Machine shop turnings	13.00 to 13.50

Buffalo

Pig Iron Buying Active; Mostly for Second Quarter Delivery

BUFFALO, Feb. 27.—Second quarter buyers have been active and about 35,000 tons of foundry iron has been sold. For No. 2 plain \$28 has been the rule in quotations, although several furnace interests continue to get reports of isolated quotations of \$27.50. The 50c. differential is firm. The tone of the market is strong and there is considerable activity. A number of good-sized inquiries are out, including one for 3000, one for 2600, one for 2300 and several 1000-ton lots. Malleable is firm at \$28.50. Melters are more receptive to buying with the close of February, and while most of the business is for second quarter, there is some for prompt delivery. The tendency of buyers generally is to cover for second quarter in view of the increased strength in the market.

We quote f.o.b. per gross ton Buffalo as follows, the higher price being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil...	\$29.50 to \$30.00
No. 2X foundry, 2.25 to 2.75 sil...	28.00 to 28.50
No. 2 plain, 1.75 to 2.25 sil...	27.50 to 28.00
Basic	28.00
Malleable	28.50
Lake Superior charcoal	34.78

Finished Iron and Steel.—Bar, shape and plate prices are stronger, and though there is no improvement in the ability of mills to handle business, there is a stronger demand for all products, and 2.25c. now seems to be the minimum price in all offices. One independent is reported to be ready to advance to 2.35c. on bars. Inquiry is not spectacular and ranges mostly from car-loads to 100 tons. A steel car company which had been inquiring for a number of weeks for various tonnages of plates and bars has closed for 5000 tons. Pipe demand is extremely brisk and one independent is taking limited tonnages in oil country stock. There is no abatement to the strong demand for sheets; a small lot of galvanized sheets was sold at 4.75c.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.35c.; plates, 3.35c.; soft steel bars, 3.25c.; hoops, 4.35c.; bands, 4.05c.; blue annealed sheets, No. 10 gage, 4.05c.; galvanized steel sheets, No. 28 gage, 5.85c.; black sheets, No. 28, 4.85c.; cold rolled round shafting, 4.10c.

Old Material.—The market is strong, and it is mostly the outgrowth of demand from outside the district. Local buyers are not very active and against

this there is a stronger situation in Youngstown, with higher offers for heavy melting steel than local.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$22.00 to \$23.00
Low phos., 0.04 and under	24.25 to 25.00
No. 1 railroad wrought	20.00 to 20.50
Car wheels	22.00 to 23.00
Machine-shop turnings	15.50 to 16.00
Cast iron borings	17.50 to 18.00
Heavy axle turnings	20.00 to 20.50
Grate bars	19.50 to 20.00
No. 1 busheling	19.25 to 19.75
Stove plate	19.00 to 19.50
Bundled sheet stampings	15.50 to 16.00
No. 1 machinery cast	23.50 to 24.50
Hydraulic compressed	19.50 to 20.00
Railroad malleable	23.00 to 23.50

Philadelphia

Prices of Plates, Shapes and Bars, Pig Iron and Scrap Advance

PHILADELPHIA, Feb. 27.—Four Eastern plate mills are now quoting 2.50c., Pittsburgh, as their minimum on sheared plates, while 2.50c., mill, for shipment west is the ruling quotation. One independent maker of plates, shapes and bars quotes 2.50c., Pittsburgh, on all three commodities. One independent plate mill is still selling at 2.35c., but may advance its price shortly. Neither the Carnegie Steel Co. nor the Bethlehem Steel Co. has advanced from 2.25c., but the former cannot promise early deliveries and the latter is taking business very sparingly, being sold up solidly for about three months. Pittsburgh and Youngstown mills are taking practically nothing in this district. The attitude of some of the mills in advancing prices is to stave off further business, as they do not want to commit themselves too far ahead at any price due to uncertainty as to costs later on, especially if the expected rise in wages occurs. Makers of spikes and track bolts have put up prices \$5 a ton. Foundry pig iron has been uniformly advanced \$1 a ton following heavy purchases for second quarter. Scrap also continues on the up-grade, notwithstanding the lack of heavy sales. Advances range from \$1 to \$3 a ton on some grades.

Ferroalloys.—The leading domestic maker of ferromanganese has no price. It has not advanced to \$110, seaboard, as quoted by British makers, but it is unwilling to sell further tonnage at \$107.50, furnace, which is its nominal price. There have been sales of foreign spiegeleisen at \$40.50, f.o.b. cars, Baltimore, and the next price will probably be \$41. Domestic spiegeleisen is quoted at about \$37, but is hard to get for early delivery.

Pig Iron.—Sales of foundry iron by eastern Pennsylvania and New Jersey furnaces within the past week have totaled about 50,000 tons, these including tonnages for New England and the New York district. Probably the total for two weeks is not far short of 100,000 tons in addition to heavy sales of basic reported a week ago. A few days ago a Delaware steel maker bought 6000 to 8000 tons of basic and a New England wire company took 2000 tons. Practically all of the foundry iron sold last week was on the basis of \$28, furnace, but today makers uniformly advanced quotations \$1 a ton and some are quoting \$2 higher. The new range of prices is \$29 to \$30 on No. 2 plain and \$30 to \$31 on No. 2X, with an additional \$1 for No. 1X. Basic is firmer and would not be quoted today at less than \$28.50, delivered. Several furnaces are virtually out of the market; at least they are inclined to wait for further developments before taking on additional tonnage. Prices of foreign iron have been slightly advanced, based on higher prices abroad, and the probability that no more iron will be shipped from the other side. Those who have foreign iron in stock are holding it in anticipation of a further rise in domestic pig iron prices. One Virginia furnace dropped its price recently to \$26 base, but has advanced to \$27, and the latter price is now minimum for all Virginia iron. The Virginia furnaces have not shared very largely in the buying movement of the past two weeks, as they are

seriously handicapped by high freight rates. Last week's receipts of foreign iron totaled 6274 tons, of which 4290 tons came from England and 1984 tons from France. The Delaware River Steel Co., which has been an active pig iron seller in recent weeks, will probably have its furnace at Chester in blast within a few days.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to \$1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25	\$29.76 to \$31.14
East. Pa. No. 2X, 2.25 to 2.75	30.76 to 32.14
East. Pa. No. 1X	31.76 to 33.14
Virginia No. 2 plain, 1.75 to 2.25	
sil.	32.17 to 33.17
Virginia No. 2X, 2.25 to 2.75	33.17 to 34.17
Basic delivered eastern Pa.	28.50 to 29.00
Gray forge	28.50 to 29.00
Malleable	31.14 to 31.26
Standard low phos. (f.o.b. furnace)	35.00
Copper bearing low phos. (f.o.b. furnace)	30.00

Foreign Pig Iron

All prices f.o.b. cars Philadelphia, duty paid.	
Scotch foundry, 2.50 to 3 sil.	\$29.00 to \$29.50
English foundry, 1.50 to 2 sil.	28.00 to 28.50
English foundry, 2 to 2.50 sil.	28.50 to 29.00
English foundry, 2.50 to 3 sil.	29.00 to 29.50
Continental foundry, 1.80 to 2.50	
sil.	28.50
Continental foundry, 2.50 to 3 sil.	29.50
Low phos., copper free, guar. not	
over 0.035 per cent phos.	30.00 to 32.00
Continental, phos. 1.50; sil. 2 to 3.	28.00 to 28.50

Coke.—Blast furnace coke is available at \$7 and foundry coke at \$8 to \$8.50, Connellsville.

Ore.—Last week's receipts of iron ore from Sweden were 15,063 tons. British South African chrome ore is still arriving in large quantities, 5700 tons having come in last week.

Semi-Finished Steel.—Eastern mills having open-hearth rerolling billets to sell would not quote less than \$42.50, Pittsburgh, while on forging billets \$47.50, Pittsburgh, would not now be easy to get, one or two mills naming \$50.

Plates.—The Midvale Steel & Ordnance Co., the Lukens Steel Co., the Central Iron & Steel Co. and the Worth Steel Co. are now all quoting 2.50c., Pittsburgh, as a minimum on plates. One Eastern mill names 2.35c., Pittsburgh, but may advance shortly. The Carnegie Steel Co. and the Bethlehem Steel Co. have not gone above 2.25c., Pittsburgh, but have very little to sell for early delivery. The Pennsylvania Railroad has bought heavily. Two inquiries from this road last week totaled 20,000 tons, of which 12,000 tons was copper-bearing plates and 8000 tons ordinary tank quality. A part of this business was placed. Locomotive business continues on a large scale, the latest noteworthy order being for 58 locomotives for the Great Northern. A good deal of the current inquiry comes from points West and Eastern mills are quoting 2.50c., mill, on such business.

Warehouse Business.—Local steel jobbers will probably advance prices about \$5 a ton this week. The new price, it was expected today, would go into effect March 1. We quote, subject to immediate change, the following prices for local delivery:

Soft steel bars and small shapes, 3.15c.; iron bars (except bands), 3.15c.; round edge iron, 2.25c.; round edge steel, iron finish, 1 1/2 x 1/2 in., 3.35c.; round edge steel planished, 4c. tank steel plates, 1/4-in. and heavier, 3.25c.; tank steel plates, 1/8-in., 3.47c.; blue annealed steel sheets, No. 10 gage, 3.85c.; black sheets, No. 28 gage, 4.60c.; galvanized sheets, No. 28 gage, 5.75c.; square twisted and deformed steel bars, 3.15c.; structural shapes, 3.25c.; diamond pattern plates, 1/4-in., 4.95c.; 5/16-in., 5.15c.; spring steel, 4.25c.; round cold-rolled steel, 4c.; squares and hexagons, cold-rolled steel, 4.50c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.25c.; narrower than 1 in., all gages, 4.75c.; steel bands, No. 12 gage to 1/2-in., inclusive, 3.95c.; rails, 3c.; tool steel, 8.50c.; Norway iron, 6.50c.

Structural Material.—While the largest independent holds to 2.25c., Pittsburgh, on plain material, other mills are quoting from 2.35c. to 2.50c., Pittsburgh. Demand keeps up at a good rate. Several mills are quoting on very little, as they have sufficient business on hand and prefer to await further developments.

Bars.—For quick deliveries of steel bars, buyers are frequently obliged to pay 2.50c., Pittsburgh, while 2.35c. is the minimum for anything that can be shipped in

two or three months. Makers of bar iron are now quoting 2.25c., Pittsburgh, and have taken a fair amount of business, some from consumers who are having difficulty in getting steel bars.

Sheets.—Blue annealed sheets are quoted by independents from 2.85c. to 2.90c.; black at 3.60c. and galvanized at 4.75c. to 4.90c., all base Pittsburgh.

Track Supplies.—An advance of \$5 a ton on spikes and track bolts has been announced. New prices are: railroad spikes, 9/16 in. and larger, 3.15c. per lb.; small spikes, 1/2 in. and larger, 3.75c. per lb.; boat spikes, 3.75c. per lb.; track bolts, 4.10c.; small track bolts, 4.25c. per lb. All prices are f.o.b. Pittsburgh and for carload lots or larger.

Old Material.—The Eastern scrap market is not particularly active so far as large tonnage lots are concerned, but each sale, no matter how small, brings an advance in price. Last week's sales of No. 1 heavy melting steel were at \$22, which was \$1 a ton over the price of the week previous, but \$22 could not be duplicated this week. If any mill came into the market for a tonnage, the price quoted would probably be not less than \$24, delivered. The strength of the Pittsburgh market, where No. 1 heavy melting steel is quoted at \$24.50 to \$25, is of decided bearing on prices in this district. A sale of low phosphorus plate scrap was made by an Eastern mill at \$28, f.o.b. mill. No. 1 yard wrought is in fair demand. A sale of 200 tons was made at \$24, delivered.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$22.00 to \$24.00
Scrap rails.....	22.00 to 24.00
Steel rails for rolling.....	25.00 to 26.00
No. 1 low phosph., heavy 0.04 and under.....	28.00 to 29.00
Cast iron car wheels.....	25.00 to 26.00
No. 1 railroad wrought.....	25.00 to 26.00
No. 1 yard wrought.....	24.00 to 25.00
No. 1 forge fire.....	19.50 to 20.00
Bundled sheets (for steel works).....	19.00 to 20.00
No. 1 busheling.....	22.00 to 23.00
Mixed borings and turnings for blast furnace use.....	18.50 to 19.00
Machine shop turnings (for steel works use).....	19.00 to 19.50
Machine shop turnings (for rolling mill use).....	20.00 to 20.50
Heavy axle turnings (or equivalent).....	21.00 to 22.00
Cast borings (for steel works and rolling mills).....	20.00 to 21.00
Cast borings (for chemical plants).....	22.50 to 25.00
No. 1 cast.....	25.00 to 26.00
Heavy breakable cast (for steel plants).....	23.00 to 24.00
Railroad grate bars.....	20.00 to 20.50
Stove plate (for steel plant use).....	20.00 to 20.50
Railroad malleable.....	20.00 to 21.00
Wrought iron and soft steel pipes and tubes (new specifications).....	20.00 to 20.50
Shafting.....	25.00 to 26.00
Steel axles.....	25.00 to 26.00

Wages of skilled workers in the metal trades in Germany, which were 36.27 marks in July, 1914, were in November, 1922, 8547 m., in October 4881 and in April 853 m., according to *Wirtschaft und Statistik*. Similarly rapid advances are noted in the wages of semi-skilled workers who received 31.63 m. in July, 1914, and 8106 in November, 1922, 4669 in October and 826 in April, 1922. Unskilled workers received 23.57 m. in July, 1914; 7870 in November of last year, 4538 in October, 807 in April.

The Central Foundry Co., Birmingham, Ala., having completed its new pipe foundry at Holt blast furnace of the Central Coal & Iron Co., is operating both in the universal and sanitary pipe departments of this new works. The Birmingham Machine & Foundry Co. expects to be making sanitary pipe in its new adjunct by April 1. The capacity is 40 tons of iron a day.

Preparations are being made to effect dissolution of the Liberty Steel Co., a subsidiary of the Trumbull Steel Co., Warren, Ohio. A. N. Flora, vice-president of the Trumbull company, is president of the Liberty company, which operates a tin plate property at Leavittsburg, in Trumbull county, Ohio.

INDUSTRIAL WAGES

Continuous Increase in Last Six Months of Last Year

A study of earnings, employment and hours just completed by the National Industrial Conference Board, covering nearly 600,000 wage earners in 23 industries, shows a fairly steady and general increase of hourly and weekly earnings, month by month during the last half of 1922. The number employed and average hours worked also showed steady progress, indicating a firm revival of industry and business. The advance in hourly and weekly earnings during December was, however, slightly less than that in November, and the "real" earnings, or purchasing power of hourly and weekly money earnings showed no gain in December, the small increase in actual hourly and weekly earnings being offset by the increase in the cost of living in this month.

Average hourly earnings rose from \$0.484 in July, 1922, to \$0.504 in December, when they were 111 per cent higher than in July, 1914. Average weekly earnings rose from \$22.95 in July, 1922, to \$24.68 in December, when they were 101 per cent higher than in July, 1914.

The number of wage earners employed in the plants covered increased 14 per cent in the six months, and 3 per cent in December alone. Employment in identical plants at the beginning of the year 1923 was 27 per cent higher than in July, 1914. The total worker hours in the 23 industries covered increased 17.7 per cent in the six months, while the total payroll increased 22.5 per cent, indicating not only a revival of plant activity and employment but increasing prosperity for the worker.

Addition to Edgar Thomson Works, Carnegie Steel Co.

Work will be started immediately on an addition to the Edgar Thomson works, Carnegie Steel Co., Braddock, Pa., which will increase its capacity about 12 per cent. The new construction includes two additional open-hearth furnaces and the rebuilding of 12 of the 14 furnaces of that plant, capacity of which will be enlarged. The plant at present is operating at almost 100 per cent of its capacity, having 10 of 11 blast furnaces making iron.

Extension of Time Granted

WASHINGTON, Feb. 27.—The Federal Trade Commission today issued an order granting an extension of ten days for the filing of an answer in connection with the commission's complaint against the proposed consolidation of the Bethlehem Steel Co., the Midvale Steel & Ordnance Co. and the Lackawanna Steel Co. The answer was due yesterday, but the extension was granted at the request of the steel interests whose reply now will be due on March 8.

Decision as to Clayton Act

WASHINGTON, Feb. 27.—The Supreme Court of the United States, in a decision yesterday upheld in substance the interpretation placed by the Federal Trade Commission on the Clayton anti-trust law in connection with the commission's proceedings against the Aluminum Co. of America, charging restraint of trade.

A management conference is to be held on Wednesday, March 14, 1 p. m., at the Bankers' Club, 120 Broadway, New York, by the National Personnel Association. Charles R. Hook, vice-president American Rolling Mill Co., Middletown, Ohio, is to discuss "The Human Side of Production Management" and Howard Coonley, president Walworth Mfg. Co., Boston, is scheduled to make an address on "Correlation of Sales and Production." W. J. Donald, 20 Vesey Street, New York, is secretary of the association.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

For additional prices, see page 642

Plates

Sheared, tank quality, base, per lb..... 2.25c. to 2.50c.

Structural Material

Beams, channels, etc..... 2.25c. to 2.50c.

Iron and Steel Bars

Soft steel bars, base, per lb..... 2.20c. to 2.25c.

Refined iron bars, base, per lb..... 2.75c.

Hot-Rolled Flats

Hoops, ordinary gages and widths, base, per lb..... 2.90c.

Hoops, light gage, under 1 in. wide..... 3.00c. to 3.50c.

Bands, base, per lb..... 2.90c.

Strips, base, per lb..... 2.90c.

Cold-Finished Steels

Bars and shafting, base, per lb..... 2.80c.

Strips, base, per lb..... 4.75c. to 5.00c.

Wire Products

Nails, base, per keg..... \$2.80 to \$3.00

Galvanized nails, 1 in. and over..... 1.50 over base

Galvanized nails, less than 1 in..... 2.00 over base

Bright plain wire, base, No. 9 gage per 100 lb..... \$2.65 to 2.75

Annealed fence wire, base, per 100 lb..... 2.90

Spring wire, base, per 100 lb..... 3.60

Galvanized wire, No. 9, 10 and 11 base, per 100 lb..... 3.25 to 3.35

Galvanized barbed, base, per 100 lb..... 3.45c. to 3.70c.

Galvanized staples, base, per keg..... \$3.45 to \$3.80

Painted barbed wire, base, per 100 lb..... 3.20 to 3.35

Polished staples, base, per keg..... 3.20 to 3.35

Cement coated nails, base, per count keg..... 2.30 to 2.60

Woven fence, carloads (to jobbers)..... 69 to 66 1/2 per cent off list

Woven fence, carloads (to retailers)..... 66 1/2 to 64 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads..... 60 and 5 per cent off list

Machine bolts, small, cut threads..... 50 and 10 per cent off list

Machine bolts, larger and longer..... 50 and 10 per cent off list

Carriage bolts, 3/8 x 6 in.:

Smaller and shorter, rolled threads..... 50, 10 and 5 per cent off list

Cut threads..... 50 per cent off list

Longer and larger sizes..... 50 per cent off list

Lag bolts..... 60 and 5 per cent off list

Plow bolts, Nos. 1, 2 and 3 heads..... 50 and 10 per cent off list

Other style heads..... 20 per cent extra

Machine bolts, c.p.c. and t. nuts, 3/8 x 4 in.:

Smaller and shorter..... 45 per cent off list

Larger and longer sizes..... 45 per cent off list

Hot pressed square or hex. blank nuts..... \$3.25 to \$3.50 off list

Hot pressed nuts, tapped..... 3.25 to 3.50 off list

C.p.c. and t. sq. or hex. nuts, blank..... 3.25 to 3.50 off list

C.p.c. and t. sq. or hex. nuts, tapped..... 3.25 to 3.50 off list

Semi-finished hex. nuts:

9/16 in. and smaller, U. S. S. 75, 10 and 5 per cent off list

5/8 in. and larger, U. S. S. 70, 10 and 2 1/2 per cent off list

Small sizes, S. A. E. 80 and 5 per cent off list

S. A. E., 5/8 in. and larger..... 75 and 5 per cent off list

Stove bolts in packages..... 80 and 5 per cent off list

Stove bolts in bulk..... 80, 5 and 2 1/2 per cent off list

Tire Bolts..... 50, 10 and 10 per cent off list

Cap and Set Screws

Milled square and hex. head cap screws..... 75 per cent off list

Milled set screws..... 75 per cent off list

Upset cap screws..... 75 and 10 per cent off list

Upset set screws..... 80 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb..... \$3.00

Large boiler rivets, base, per 100 lb..... 3.10

Small rivets..... 65 and 10 to 65 and 5 per cent off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb..... 2.90c.

Spikes 1/2 in. and smaller, per 100 lb..... 8.50c. to 3.75c.

Spikes, boat and barge, base, per 100 lb..... 3.50c.

Track bolts, base, per 100 lb..... 3.85c. to 4.50c.

Tie plates, per 100 lb..... 2.45c. to 2.60c.

Angle bars, base, per 100 lb..... 2.75c.

Welded Pipe

Butt Weld

Steel	Black	Galv.	Iron	Black	Galv.
1/4	47	21 1/2	1/4 to 1/2	+11	+39
1/4 to 5/8	53	27 1/2	1/2	22	2
5/8	58	44 1/2	3/4	28	11
5/8 to 1	62	50 1/2	1 to 1 1/2	30	13
1 to 3	64	52 1/2			

	Lap	Weld		
2	57	45 1/2	2	23
2 1/2 to 6	61	49 1/2	2 1/2	26
7 to 8	58	45 1/2	3 to 6	28
9 to 12	57	44 1/2	7 to 12	26

Butt Weld, extra strong, plain ends

	Lap	Weld		
1/4	43	26 1/2	1/4 to 1/2	+19
1/4 to 1/2	49	32 1/2	1/2	21
1/2	55	44 1/2	7/8 to 1	28
1 to 1 1/2	62	51 1/2	1 to 1 1/2	30
2 to 3	68	52 1/2		

Lap Weld, extra strong, plain ends

	Lap	Weld		
2	55	44 1/2	2	23
2 1/2 to 4	59	48 1/2	2 1/2 to 4	29
4 1/2 to 6	58	47 1/2	4 1/2 to 6	28
7 to 8	54	41 1/2	7 to 8	21
9 to 12	48	35 1/2	9 to 12	16

To the large jobbing trade the above discounts are increased by one point, with supplementary discount of 5 per cent.

Boiler Tubes

	Lap Welded Steel	Charcoal Iron
1 1/2 in.	21 1/2	1 1/2 in. to 1 1/2 in. +12
2 to 2 1/2 in.	33	1 1/2 to 2 1/2 in. +2
2 1/2 to 3 in.	44	2 to 3 in. -8
3 1/4 to 13 in.	49	2 1/2 to 3 in. -13
		3 1/4 to 4 1/2 in. -15

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	55	2 1/2 and 2 3/4 in. 35
1 1/4 and 1 1/2 in.	47	3 in. 39
1 1/4 in.	31	3 1/4 to 4 in. 44
2 and 2 1/4 in.	31	4 1/4 in. and 5 in. 36

Hot Rolled

3 in.	41	4 1/4 to 4 in. 46
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Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base..... 85 per cent off list

Carbon 0.30 to 0.40, base..... 83 per cent off list

Plus usual differentials and extras for cutting.

Seamless Locomotive and Superheater Tubes

Cents per Ft.	Cents per Ft.
2-in. O.D. 12 gage.... 14	2 1/4-in. O.D. 10 gage.... 19
2-in. O.D. 11 gage.... 15	3-in. O.D. 7 gage.... 34
2-in. O.D. 10 gage.... 16	1 1/2-in. O.D. 9 gage.... 13%
2 1/4-in. O.D. 12 gage.... 16	5 1/2-in. O.D. 9 gage.... 53
2 1/4-in. O.D. 11 gage.... 17	5 1/2-in. O.D. 9 gage.... 55

Tin Plate

Standard cokes, per base box..... \$4.95 to \$5.10

Terne Plate

(Per package, 200-lb.)

8-lb. coating..... \$ 9.90	25-lb. coating I. C.... \$14.25
10-lb. coating I. C.... 10.20	30-lb. coating I. C.... 15.25
15-lb. coating I. C.... 11.80	35-lb. coating I. C.... 16.25
20-lb. coating I. C.... 12.00	40-lb. coating I. C.... 17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb..... 2.65c. to 3c.

No. 28 (base), per lb..... 3.50c. to 3.75c.

Regular auto body sheets, base (22 gage), per lb. 5c. to 5.50c.

Galvanized

No. 28 (base), per lb..... 4.60c. to 4.75c.

Tin-Mill Black Plate

No. 28 (base), per lb..... 3.50c. to 3.75c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic.... \$0.325	Buffalo..... \$0.265	Pacific Coast..... \$1.50
Philadelphia, export.... 0.315	Cleveland..... 0.215	Kansas City..... 0.735
Baltimore, domestic.... 0.315	Cleveland, Youngstown..... 0.215	Kansas City (pipe).... 0.705
Baltimore, export.... 0.225	Comb. 0.19	St. Paul..... 0.60
New York, domestic.... 0.34	Detroit..... 0.29	St. Paul..... 0.735
New York, export.... 0.255	Cincinnati..... 0.29	Omaha..... 0.705
Boston, domestic.... 0.365	Indianapolis..... 0.31	Omaha (pipe)..... 0.705
Boston, export.... 0.255	Chicago..... 0.34	Jacksonville, all rail.... 0.50

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lbs., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular rail-road tariffs.

Rates from Atlantic Coast ports (i. e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates, 30c. to 40c.; rods, wire rope cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe not over 8 in. in diameter, 50c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 55 per cent iron.	\$5.95
Old range non-Bessemer, 51 1/4 per cent iron.	5.20
Mesabi Bessemer, 55 per cent iron.	5.70
Mesabi non-Bessemer, 51 1/4 per cent iron.	5.05

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore	
Iron ore, low phos, 55 to 58 per cent iron in dry Spanish or Algerian.	11.50c.
Iron ore, Swedish, aver, 66 per cent iron.	9.5c. to 10c.
Manganese ore, washed, 51 per cent manganese from the Caucasus.	36 1/2c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus.	34c.
Manganese ore, Brazilian or Indian.	33c. to 34c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal.	\$7.50 to \$8.50
Chrome ore, basic 48 per cent Cr_2O_3 , crude per ton, c.i.f. Atlantic seaboard.	18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2 , New York.	60c. to 70c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace per ton.	\$107.50
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid.	110.00
Spiegeleisen, domestic 19 to 21 per cent, furnace per ton.	\$35.00 to 36.00
Spiegeleisen, domestic 16 to 19 per cent, furnace per ton.	34.00 to 35.00
Ferrosilicon, 50 per cent, delivered per gross ton.	87.50 to 90.00
Ferrosilicon, Bessemer, 10 per cent, per ton furnace.	45.50
Ferrotungsten, per lb. contained metal.	90c. to 95c.
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered.	12c. to 14c.
Ferrovanadium, per lb. contained vanadium.	\$3.50 to \$4.00
Ferrocobaltium, 15 to 18 per cent, per net ton.	200.00

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica per net ton f.o.b. Illinois and Kentucky mines.	\$20.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica per net ton, f.o.b. Illinois and Kentucky mines.	21.50
Per 1000 f.o.b. works:	
Fire Clay:	
Pennsylvania	High Duty \$43.00 to \$46.00
Ohio	40.00 to 42.00
Kentucky	40.00 to 42.00
Illinois	43.00 to 45.00
Missouri	48.00 to 50.00
Ground fire clay, per net ton.	5.50 to 8.00
Silica Brick:	
Pennsylvania	42.00
Chicago	47.00
Birmingham	48.00
Ground silica clay, per net ton.	7.50 to 9.50
Magnesite Brick:	
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)	65.00

Large Coke Production—Railroad Conditions Very Unsatisfactory

UNIONTOWN, Pa., Feb. 26.—Production of coke continues on a near normal basis in the Connellsville coke region, preferential placement by the railroads of coke cars serving to make possible the increased output. This increase, despite a slight dropping off in the demand for heating coke, has not served to disturb the price level. The situation as to the coke operators is largely satisfactory.

Greater activity in furnace operation, with the firing of new furnaces, and increased output of active furnaces, is helpful. Regional total production last week was 266,360 tons. The H. C. Frick Coke Co. fired 184 additional ovens.

Total production so far this year has been 1,694,820 tons, a gain of 1,063,580 tons over the corresponding period last year.

Situation as pertains to the coal operators is far less satisfactory. The car situation has assumed a critical phase for many operators and some possibly will suspend operations temporarily the first of the

Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)	\$40.00
Chrome Brick: Standard size, per net ton	50.00

Semi-Finished Steel, f.o.b. Pittsburgh or Youngstown

per gross ton

Rolling billets, 4-in. and over	\$40.00 to \$42.50
Rolling billets, 2-in. and under	40.00 to 42.50
Forging billets, ordinary carbons	47.50 to 50.00
Sheet bars, Bessemer	40.00
Sheet bars, open hearth	40.00 to 42.50
Slabs	40.00 to 42.50
Wire rods, common, soft base, No. 5	47.00 to 50.00
Wire rods screw stock	\$5 per ton over base
Wire rods carbon 0.20 to 0.40	\$3 per ton over base
Wire rods carbon 0.41 to 0.55	\$5 per ton over base
Wire rods, carbon 0.56 to 0.75	\$7.50 per ton over base
Wire rods, carbon over 0.75	\$10 per ton over base
Wire rods, acid	\$15 per ton over base
Skelp, grooved, per lb.	2.25c. to 2.50c.
Skelp, sheared, per lb.	2.25c. to 2.50c.
Skelp, universal, per lb.	2.25c. to 2.50c.

Finished Iron and Steel, f.o.b. Mill

Rails, heavy, per gross ton	\$43.00
Rails, light new steel base, per lb.	2.15c. to 2.25c.
Rails, light, rerolled, base per lb.	.2c. to 2.10c.
Spikes, 9/16-in. and larger, base, per 100 lb.	\$2.90 to \$3.00
Spikes, 1/2-in. and smaller, base, per 100 lb.	3.50 to 3.75
Track bolts, base, per 100 lb.	3.85 to 4.00
Tie plates, per 100 lb.	2.45 to 2.60
Angle bars, per 100 lb.	.75
Bars, common iron, base, per lb.	2.35c. to 2.50c.
Bars, rali, steel reinforcing base, per lb.	.2c. to 2.10c.
Ground shafting, base, per lb.	.320c.
Cut nails, base, per keg.	\$3.15

Alloy Steel

S. A. E. series Numbers	Bars 100 lbs.
2100 (1 1/2% Nickel 10 to 20 per cent carbon)	\$3.00
2300 (3 1/2% Nickel)	5.50
2500 (5% Nickel)	8.00
3100 (Nickel Chromium)	4.50
3200 (Nickel Chromium)	6.25
3300 (Nickel Chromium)	8.50
3400 (Nickel Chromium)	7.50
5100 (Chromium Steel)	4.00
5200 (Chromium Steel)	7.25
6100 (Chromium Vanadium bars)	5.25
6100 (Chromium Vanadium spring steel)	5.00
9250 (Silico Manganese spring steel)	4.15
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	5.25
Chromium Molybdenum bars (0.70-1 Chromium, 0.25-0.40 Molybdenum)	5.25
Chromium Molybdenum spring steel (0.50-0.70 Chromium, 0.15-0.25 Molybdenum)	4.75

Above prices are for hot-rolled alloy steel bars, forging quality, per 100-lb. f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are \$10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets down to and including 2 1/2-in. sq. there is a size extra of \$10 per gross ton; on billets smaller than 2 1/2-in. sq. the net ton bar price applies.

month unless there is an improvement. Coal price levels, even in the face of the present shortage of cars, have set a new low mark during the week. Coal operators, however, are not so much alarmed over the price situation. They know that New England is badly in need of fuel but that trains are snowbound, termini are congested and embargoes are such that deliveries are impossible. The lake season, too, will open in April. The railroads are suffering from a crying need of locomotive power.

A safety code on walkway surfaces was voted as desirable at a conference attended by 63 representatives of trade associations, technical societies, safety organizations and Government departments, held in the Engineering Societies Building in New York, Feb. 14. The development of this code is to be carried out under the procedure of the American Engineering Standards Committee. The conference voted to include in the code the following places: elevator floors, elevator landings, corridor floors, ramps, runway floors, stair treads and landings, floors around machinery, etc.

NON-FERROUS METALS

The Week's Prices

Feb.	Cents Per Pound for Early Delivery						
	Copper, New York		Straits		Lead		
	Lake	Electro- lytic*	New York	New York	St. Louis	New York	St. Louis
21	16.00	15.75	43.12½	8.15	8.15	7.70	7.35
22	16.12½	16.00	44.55	8.20	8.20	7.80	7.45
23	16.50	16.25	...	8.25	8.25	7.85	7.50
24	16.75	16.37½	44.25	8.25	8.25	7.90	7.55
25	16.87½	16.50	45.00	8.25	8.25	7.95	7.60

*Refinery quotation; delivered price 1/4c. higher.

New York

NEW YORK, Feb. 27.

Considerably higher prices prevail in all the markets. Copper has advanced into new high ground and tin has reached the highest price since 1920. The lead market has advanced moderately and zinc is considerably higher than a week ago.

Copper.—The electrolytic copper market continues active and feverish with heavy sales reported for all positions, including May and June. Advances in quotations have been almost daily occurrences, but an accurate appraisal of the market is difficult. Electrolytic copper is quoted at a minimum of 16.75c., delivered, with some sellers asking 1/4c. higher and some sellers refusing to quote. Sales are reported to be for actual consumption and not for speculation, with many consumers covering their needs into the last parts of the second quarter. While the domestic market is the most active, sales for foreign consumption are also reported as heavy, at least 3,000,000 lb. having been sold today. Lake copper is also higher and is also quoted at 16.75c. to 17c., delivered.

Tin.—Compared with last week the Straits tin market this week has been quiet, but a fair business has been done nearly every day. Sales of at least 500 tons were made on Feb. 21, all positions being involved. Friday, following the holiday on Thursday, was quiet with some desire exhibited to take profits, sales being made at a range of 44.50c. to 44.62½c., with April delivery sold at 44.50c. On Saturday from 100 to 150 tons changed hands, futures selling at 44.62½c. to 44.87½c. Yesterday transactions amounted to about 150 tons with spot selling at 44.25c. and futures at 44.25c. to 44.37½c. Today a moderate business has been done and quotations are again higher with spot Straits quoted at 45c., New York, the highest price reached since 1920, due partly to private advices of a very strong market in London. In the British market today prices were about £5 per ton higher than a week ago, with spot standard at £201, future standard at £202 15s. and spot Straits at £208 15s. The scarcity of spot Straits is reflected in the increasing spread of £7 15s. per ton between spot standard and spot Straits. Arrivals thus far this month have been 4885 tons, with 8033 tons reported afloat.

Lead.—This market is very strong with prompt and March metal practically unobtainable, and with April delivery exceedingly scarce. Recent importations have not relieved the stringency and consumption continues on a large scale. On Friday, Feb. 23, the leading interest advanced its price from 8c. to 8.10c., New York. Since then the outside market has grown stronger and sales have been made at St. Louis and at New York as high as 8.25c.

Zinc.—Pronounced strength continues to prevail in the market for prime Western. March metal is scarce and prices are more or less nominal with almost any figure obtainable for such as is offered. A fair appraisal of this position is about 7.60c., St. Louis, or 7.95c., New York. For future positions the market is also strong with 7.55c. to 7.60c., quoted and obtained for May-June delivery. Heavy consumption by brass makers is one factor and galvanizers have also been buyers.

Nickel.—Shot and ingot nickel are quoted at 29c. to 32c., with electrolytic obtainable at 32c., these quo-

tations being those of the leading producers. In the outside spot market shot and ingot nickel are quoted at 29c. to 32c.

Antimony.—Wholesale lots of Chinese metal for early delivery are quoted at 7.37½c. per lb., New York, duty paid, with the market strong.

Aluminum.—Virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery, is quoted at 24.50c. to 25c. per lb., New York, duty paid, by importers of the foreign product. Quotations by the leading domestic producer are not made public.

Old Material.—Business continues good with prices advancing each day. The market is firm. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	15.75
Copper, heavy and wire	14.25
Copper, light and bottoms	12.50
Heavy machine composition	12.50
Brass, heavy	10.00
Brass, light	7.50
No. 1 red brass or composition turnings	10.75
No. 1 yellow rod brass turnings	9.00
Lead, heavy	7.50
Lead, tea	6.25
Zinc	5.00

Chicago

Feb. 27.—Practically all of the metals, new and old, have advanced. Lead and zinc are now the highest in three years. Buying of copper has been heavy, but sales of the other metals, while liberal, have not been so large as the advances would lead one to expect. We quote, in carload lots, lake copper, 17c.; tin, 47c.; lead, 8.30c.; spelter, 7.75c.; antimony, 8.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 12c.; red brass, 11c.; yellow brass, 8.25c.; lead pipe, 6.50c.; zinc, 5c.; pewter, No. 1, 25c.; tin foil, 27c.; block tin, 35c.; all buying prices for less than carload lots.

Great Activity of Mills in the Youngstown District

YOUNGSTOWN, Feb. 27.—With minor exceptions mill operations in the Mahoning and Shenango Valleys are continuing at a high rate, finishing units averaging 90 per cent. No. 1 blast furnace at Hubbard of the Youngstown Sheet & Tube Co. is temporarily suspended, but its resumption is expected shortly. There are 34 blast furnaces in the two Valleys which are in action.

Five sheet mills in the Haselton complement of the Sharon Steel Hoop Co. will continue idle for one more week. They suspended a week ago, owing to mechanical difficulties. The 132-in. plate mill of the Brier Hill Steel Co. is down for several weeks for repairs and alterations.

A number of tin mills at the Liberty plant of the Trumbull Steel Co. are idle. The Newton Steel Co., which is installing additional sheet mills at its Newton Falls plant, expects to have all of its 20 units operating by April 1.

Shortage of steel is still a deterrent to larger rolling mill operation, the Mahoning Valley Steel Co. suspending one of its eight mills at Niles this week for lack of steel supplies. Of 113 sheet mills in the Mahoning Valley, 103 were scheduled at the beginning of the week.

Idle for nearly two years, the by-product coke works at Farrell, Pa., of the Carnegie Steel Co., will resume as soon as the ovens can be placed in readiness. Officials state it will require some time to overhaul the plant, which has three batteries, for a total of 212 ovens. They have been inactive since March 16, 1921.

Titusville Forge Co., Titusville, Pa., among other additions to its plant, has installed a department for the manufacture of piston rods and trimmer steels and one for small intricate finished work, as well as close and deep boring.

EXPORT MARKET STRONG

Japan Places Rails in United States—Demand for Wire and Wire Products—German Buying Reported

NEW YORK, Feb. 27.—The volume of inquiry from practically all foreign markets continues to increase, particularly from Japan, but there is considerable hesitancy in placing business as a result of the higher prices now being quoted. In many products the export price today is reported to be equivalent to the domestic quotation plus freight and insurance. This firmness is particularly noticeable in tin plate, but although the export price of rails has been increased, the c.i.f. quotation is said to be generally from \$50 to \$51 per ton, c.i.f. Japan. Light gage black sheets are still quoted at about \$106 per ton, c.i.f. Japanese port. Black sheet inquiries are reported by exporters to be quite numerous, but generally small, as a rule calling for 200 or 300 tons. There is also a fair demand from Japan for wire, wire rods and wire nails. Wire nails inquiries range from 1000 to 2000 kegs.

Of the recent rail inquiries from Japan, the 10,000 tons of 60-lb. rails inquired for by the Imperial Government Railways for Otaru and Yokohama was awarded to Mitsui & Co. and placed in the United States. The tender of the Kioto Electric Railway Co., calling for two miles of 90-lb. rails and about $\frac{1}{2}$ mile of 102-lb. grooved rails, as well as frogs and switches, was awarded to Suzuki & Co., which received the rails and to Okura & Co., which received the frogs and switches.

Scotch foundry iron is still moving upward. The latest cabled quotation on about No. 3 Scotch is £6 11s. to £6 16s. per ton, c. & f. Atlantic port, which, with the addition of insurance, duty and profit would bring the price on dock to about \$34 per ton.

While there are numerous rumors of purchasing in the United States by German interests to fulfill contracts in foreign markets, information of specific instances is as yet unobtainable either from possible German buyers or American sellers. Representatives of German steel interests are, however, in the United States, and, according to the representative of a large German interest, purchasing here is contemplated. In addition to purchases of coal in Britain, German companies are reported to have placed orders for steel for export. Some purchasing of coal in the United States is also reported. The recent rise in the copper market here has made the price of copper higher than the prevailing market in London. A buyer for a German consumer has recently quoted \$16.31 per 100 lb. to his principals, but the business will probably go to the London market at 20c. or 25c. per 100 lb. less.

Construction of the Shongweni reservoir, about 18 miles south of Durban, Natal, has been started, according to a report to the Bureau of Foreign and Domestic Commerce. Plans are now under consideration for the erection of a plant near Pretoria for the manufacture of corundum wheels. The American consul at Santander, Spain, reports that a steel mill in Spain contemplates important expansion. In Argentina the National Sanitary Works has awarded a contract for the construction of the Bahia Blanca sewerage system extension to an Argentine firm. The contract includes tributary sewers and manholes with connections to every house. Further information can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, or district offices in the United States.

The strike at the Newcastle Steel Works of the Broken Hill Proprietary Co., Ltd., of Australia, has been settled, according to a cable to the Department of Commerce from Trade Commissioner J. W. Sanger, Melbourne, and operations will be resumed at once. The steel works had been closed, mainly on account of labor troubles, for considerably over a year. This settlement has been aided by a decline in the price of coal. Labor conditions are now generally good.

GERMAN PRICES DROP FURTHER

Exchange Drop Operates to Leave German Iron and Steel Prices Below World Prices

(By Radiogram)

BERLIN, GERMANY, Feb. 26.—Foundry iron No. 1 is now quoted at 648,300 m. per metric ton (\$28.98 per gross ton at 4.4c. per 1000 m.) compared with 745,800 m. (\$38.64 at 5.1c. per 1000 m.) last week, with 706,300 m. (\$25.11 at 3.5c.) and 506,300 m. (\$13.89 at 2.7c.) on Feb. 12 and 5 respectively.

Steel ingots have been reduced by the Stahlbund to 749,000 m. (\$33.48) compared with 849,000 m. (\$43.99) last week, with 955,000 m. (\$33.95), and with 623,000 m. (\$17.09) two and three weeks ago. Steel bars are now pegged at 1,043,000 m. (2.08c. per lb.) compared with 1,183,000 m. (2.74c. per lb.) last week, with 1,331,000 m. (2.11c. per lb.), and with 860,000 m. (1.05c. per lb.) two and three weeks ago. Thin steel sheets are now held at 1,649,000 m. (3.29c. per lb.) compared with 1,870,000 m. (4.33c. per lb.) last week, with 2,104,000 m. (3.34c.) per lb.), and with 1,341,000 m. (1.64c. per lb.) two and three weeks ago.

[Due to the drop in the exchange rate since last week, German prices of bars and sheets are now below American prices based on gold values, having been above those prices a week ago.]

Pressed Steel Car Report

Net operating loss of the Pressed Steel Car Co. for the year ended Dec. 31, 1922, was \$810,606, compared with a profit of \$947,847 in the previous year, as reckoned after taxes. The total income of \$868,918 diminished to \$58,312 after meeting the operating loss. Dividends on preferred stock amounted to \$875,000, and this with \$400,000 allowed for depreciation, etc., caused a deficit of \$1,216,688, which was deducted from the previous surplus and undivided profits of \$14,677,900. There remains a surplus as of Dec. 31, 1922, of \$13,461,212. President F. N. Hoffstot said in his statement to stockholders:

"The results obtained, while not satisfactory, are the result of the most careful and conscientious work on the part of the organization. The conditions that had to be met during 1922, affecting particularly the manufacture of cars, were unusually difficult. Inquiries for cars early in the year were few and as every encouragement had to be given the railroads to place orders, business was taken at cost and in some cases, below cost, in order to enable us to establish and maintain an organization."

Shipments of the Lumen Bearing Co., producer of mill equipment supplies, were larger in January than those of the entire first quarter in 1922. The company operates plants at Buffalo and Youngstown. Plans for extensions to the company's property at Youngstown are under consideration. N. F. Young, assistant treasurer, was elected a director at the annual stockholders' meeting, succeeding L. F. Jones, resigned. Other directors were re-elected.

Tank car builders at Sharon, Pa., in the Shenango Valley, have recently been awarded business totaling a million and a quarter dollars. The Standard Tank Car Co. has received an order for 200 tank cars from the American Tar Products Co. and for 100 tank cars from the Wilcox Oil & Gas Co. The Pennsylvania Tank Car Co. has been awarded 21 tank cars by the General Petroleum Corporation.

The Truscon Steel Co., Youngstown, will start at once construction of two additional factory buildings at its property on Albert Street in Youngstown. One unit will be 80 x 400 ft. and the other 80 x 200 ft. Both will be of the standard type of factory building which the company manufactures.

FABRICATED STEEL BUSINESS

Awards Total About 31,000 Tons, with About 23,000 Tons Pending—New Tank Inquiries About 14,000 Tons

Fabricated steel work awarded in the past week includes the following:

A parochial school in Brooklyn, 300 tons, and one on Staten Island, 500 tons, to the George A. Just Co.

Apartment building, 1150 Fifth Avenue, New York, 1300 tons, to Paterson Bridge Co.

Heide candy warehouse, Van Dam Street, New York, 1300 tons, to Hedden Iron Construction Co.

Ohio Power Co.'s power plant, Canton, Ohio, 7000 tons, to American Bridge Co.

Edgemore Iron Co., shop at Edgemore, Del., 500 tons, to Belmont Iron Works.

Elks' Club, Omaha, 800 tons, to Paxton Vierling Iron Works.

Two bridges, Appleton, Wis., 800 tons, divided between Wausau Iron Works and American Bridge Co.

Santa Fe Lines, four 115-ft. oil storage tanks, various locations, 745 tons, to Kansas City Structural Steel Co.

Library building, Iowa State College, Ames, Iowa, 350 tons, to Rock Island Bridge & Iron Co.

Grand Island, Neb., power station, 165 tons, to Kansas City Structural Steel Co.

Filter houses for Godchaux Sugars, Inc., New Orleans, 219 tons, and works at Reserve, La., 900 tons, to Virginia Bridge & Iron Co.

State bridge, No. 3753, Northfield, Minn., 242 tons, to Illinois Steel Bridge Co.

Nekoosa Edwards Paper Co., Alexander mill, Nekoosa, Wis., 166 tons, to unnamed fabricator.

Minneapolis & St. Louis, remodeling approach to Fifth Street North bridge, Minneapolis, 158 tons, to unnamed fabricator.

Addition to Lakeside power plant for Milwaukee Electric Railway & Light Co., 1000 tons, to Milwaukee Bridge Co.

Bridge for City of Merrill, Wis., 122 tons, to Wausau Iron Works.

Ford garage and service building for Ernest A. Swendson, Milwaukee, 100 tons, to Worden-Allen Co.

Nell House, Columbus, Ohio, 5000 tons, to Mt. Vernon Bridge Co.

War Memorial Building, Nashville, Tenn., 900 tons, to Nashville Bridge Co.

Plant for Cincinnati Galvanizing Co., Cincinnati, 150 tons, to L. Schreiber & Sons.

Plant for Kennedy Car Liner Co., Shelbyville, Ind., 200 tons, to Central States Bridge Co.

Office building, Dayton, Ohio, 150 tons, to Goethals Engineering Co.

Hughes High School, Cincinnati, 100 tons, to L. Schreiber & Sons.

Norwood High School, Norwood, Ohio, 100 tons, to L. Schreiber & Sons.

Gas holders at Belleville, Ill., and Council Bluffs, 200 tons, to Stacey Mfg. Co.

Edwards Hotel, Jackson, Miss., 1200 tons, to Virginia Bridge & Iron Co.

Texas Sugar Refining Co., Texas City, Tex., 3500 to 4000 tons, to Ingalls Iron Works.

Negro Masonic Temple, Birmingham, 600 tons, to Ingalls Iron Works.

Central Iron & Coal Co., Holt, Ala., foundry, 300 tons, to Ingalls Iron Works.

Alabama Dry Dock & Shipbuilding Co., Mobile, 1400 tons, to Johnson & Thompson.

Kansas City Baseball Co., Kansas City, Mo., grandstand, 600 tons, to the Kansas City Structural & Steel Co.

Galion Iron Works Co., Galion, Ohio, 275 tons, to the Massillon Bridge & Structural Co.

American Shipbuilding Co., Lorain, Ohio, 200 tons. This company will do its own fabricating.

National Metal Molding Co., Economy, Pa., plant extension, 250 tons, to Jones & Laughlin Steel Corporation.

Cleveland & Western Coal Co., Cleveland, 1000 sets of mine timbers, 250 tons, to Jones & Laughlin Steel Corporation.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Lefcourt loft building at 148 West Thirty-seventh Street, New York, 1000 tons.

Highway bridge, Massena, N. Y., 1000 tons.

Pan-American Oil Co., tanks, for Honolulu, 10,000 to 12,000 tons.

Associated Oil Companies of California, oil storage tanks, 8000 tons.

Petroleum Midway Corporation, San Pedro, Cal., oil storage tanks, 6000 tons.

Columbia Mutual Insurance Co., Building, Memphis, Tenn., 1500 tons.

Pere Marquette shops, Grand Rapids, Mich., 2600 tons, Indiana Bridge Co., low bidder.

State lock and dam, Starved Rock, Ill., 300 tons of structural, castings and forgings.

Union Station, St. Paul, Minn., tonnage not yet estimated

Ford Motor Co., Atlanta, Ga., assembling plant, 425 tons, bids being taken.

E. Lilly & Co., Indianapolis, office building, 100 tons, bids being taken.

Several Ohio highway bridges, aggregating 500 tons.

Spencer Building Cleveland 200 tons.

National Lamp Works, Cleveland factory, 400 tons, bids taken.

Onondaga Litholite Co., Syracuse, N. Y., extension to foundry, 220 tons, bids taken.

Baby and Children's Hospital, Cleveland, 600 tons.

Chicago & Northwestern bridge requirements for 1923, 300 tons.

RAILROAD EQUIPMENT BUYING

Very Quiet Week in Both Orders and Inquiries for Cars and Locomotives

The Great Northern has ordered 125 tank cars from the Chicago Steel Car Co.

The Hillman Coal & Coke Co., Pittsburgh, has ordered 300 70-ton hopper cars from the Pressed Steel Car Co.

The Seaboard Air Line is inquiring for 1000 ventilated box cars and 1000 steel underframe gondolas.

The Southern Railway is expected to close this week for 5200 cars.

The Louisville & Nashville Railroad's inquiry, which is expected shortly, will call for 4000 hopper cars, 2000 box cars and 2000 gondolas.

The Fruit Growers' Express will probably order this week 2000 steel underframes for cars it will build in its own shops.

Locomotives in need of repair on Feb. 1, according to the car service division of the American Railway Association, totaled 15,412, or 23.9 per cent of the total number on line. This was the smallest number in need of repair since the shopmen's strike began on July 1, 1922, at which time there were 14,412, or 22.4 per cent. Locomotives in need of light repairs numbered 13,537 on Feb. 1, 640 less than on Jan. 15, while locomotives in need of light repairs totaled 1875, or a decrease of 21 within the same period.

The Great Northern has placed 58 locomotives with the Baldwin Locomotive Works.

The Illinois Central has ordered 50 air dump cars from the Western Wheeled Scraper Co.

The Chicago & Illinois Midland is inquiring for 500 gondola car bodies.

Atlantic Coast Line is in the market for 500 steel underframes.

The Live Poultry Transportation Co. will build 100 poultry cars in its own shops.

The Buffalo & Susquehanna has placed 200 hopper bodies with Buffalo Steel Car Co.

The Canadian National Railways have awarded 1000 box, 600 automobile, 100 ballast, 20 baggage, 10 mail, 30 sleeping cars and 35 coaches to the Canadian Car & Foundry Co.; 1000 box, 10 baggage and 400 automobile cars to National Steel Car Co. and 500 box, 100 general service and 100 ore cars and 276 freight car repairs to the Eastern Car Co.

Industrial Accidents in 1921

The Bureau of Mines, Department of the Interior, has published in pamphlet form a report by William W. Adams on accidents at metallurgical works in the United States during 1921. There was a reduction in the number of accidents during that year, which is ascribed largely to the low scale of operations. The proportion of accidents to the number of men working, however, was smaller than usual. The pamphlet is filled with tables which will be of interest to those engaged in accident-prevention work. Copies are available upon application to the Government Printing Office, Washington.

PERSONAL

W. G. Maguire, formerly executive vice-president of the St. Louis Coke & Chemical Co., was elected president on Feb. 20. At the same time he was also elected to the presidency of the St. Louis Coal & Iron Co., of which he was formerly vice-president. He is also a director and a member of the executive committee of the National Enameling & Stamping Co., as well as vice-president and a member of the executive committee of the American Coke & Chemical Co., Chicago. Mr. Maguire entered the pig iron business in 1905, associating himself with the DeCamp Brothers & Yule Co., St. Louis, leaving their employ in 1909 to become sales manager of the Domhoff & Joyce Co., pig iron brokers of Cincinnati. In 1915 he became associated with the American Coke & Chemical Co., and also the St. Louis Coke & Chemical Co.



W. G. MAGUIRE

George Morrissey has been promoted to the position of chief engineer and director with the American Coke & Chemical Co., Chicago. He was formerly engineer of the American company and acted in a consulting capacity for the St. Louis Coke & Chemical Co.

Henry H. Glassie, an attorney of Washington, has been named by President Harding to be a member of the United States Tariff Commission. Mr. Glassie is a Democrat and his nomination was made on account of the resignation of Thomas Walker Page.

Chairman Charles M. Schwab of the Bethlehem Steel Corporation is not in Europe as a Government observer, it was announced at the White House last Friday. It was stated, however, that upon his return to the United States Mr. Schwab may call upon President Harding and make a report on conditions in Europe.

Alfred I. Phillips, formerly associate gas engineer of the National Bureau of Standards, and latterly service engineer of the American Gas Association, has become affiliated with Arthur D. Little, Inc., consulting chemist, 30 Charles River Road, Cambridge 39, Mass., as gas engineer.

C. W. Forcier has resigned as Pittsburgh district sales representative of the Titusville Forge Co., Titusville, Pa. His successor has not yet been announced.

Oskar Kylin has been elected vice-president of the Foster Machine Co., Elkhart, Ind., and will continue in immediate charge of sales and engineering.

Bayard T. Cummings, for seven years assistant district manager of sales in the New York office of the Brier Hill Steel Co., 120 Broadway, under W. C. Dickey, has accepted a position as head of the sheet and tin plate department of J. K. Larkin & Co., Inc., 253 Broadway, New York, iron and steel jobbers. For nine years previous to his affiliation with Brier Hill Steel Co. he was in the New York office of the American Sheet & Tin Plate Co.

Richard W. Crocker, for the past seven years associated with the Boston office of Mapning, Maxwell & Moore, Inc., has resigned to become direct New England representative of the Clark Equipment Co., Buchanan, Mich., drills.

Mervin Kessler, superintendent Athol Machine Co., Athol, Mass., has been appointed general manager to succeed H. R. Linton, resigned.

W. F. Furman, for many years with the American Locomotive Co. and more recently eastern representative of the Le Moyne Steel Co., Pittsburgh, has been appointed district manager for the Cutler Steel Co., Pittsburgh, and will make his headquarters at 50 Church Street, New York.

Charles J. Schmid, formerly in charge of the Boston office of the Uehling Instrument Co., Paterson, N. J., power plant gages, has been appointed manager of sales for Greater New York and Long Island. His headquarters will be with the home office temporarily.

C. S. Sale, since 1918 assistant to the president Railway Car Manufacturers' Association, with office at 61 Broadway, New York, has resigned that position and accepted an appointment with the American Car & Foundry Co. His address will be 165 Broadway, New York.

Peare Edwin Thomas, since 1913 Cincinnati district manager of the insulation division of the Armstrong Cork & Insulation Co., becomes sales service manager of the company on April 1. He was graduated in electrical engineering from Pennsylvania State College in 1909 and joined the Armstrong company in 1912 as a salesman.

J. H. Johnston has been appointed controller of the Rickenbacker Motor Co., Detroit. He has served in the capacity of executive head of the production cost department since the Rickenbacker company began operations.

The United States has lost another valuable attaché in the person of William Chapin Huntington, who has resigned and formed a partnership with Edgar C. Welborn, for many years a financial officer of large corporations and for a long period identified with the Illinois Steel Co. The firm will be Welborn & Huntington, business engineers and counselors, 19 South La Salle Street, Chicago. Mr. Huntington's original training for fact finding and research was with the National Tube Co., Pittsburgh, as assistant to Frank N. Speller. His work for the Government during the past 15 years has been essentially business fact finding. His job in Germany, Russia and France was to get facts about European industries for American business men on which they might base executive decisions and policies. As commercial attaché of the American Embassy in Paris 1920 to 1922, Mr. Huntington made surveys of French industries and compiled reports on the market possibilities for American products in France and colonies. He made investigations and reports on French railroad and hydroelectric developments for investment bankers, and rendered valuable service in preventing French legislation adverse to American business interests, especially with regard to tariffs, banking laws and participation of American capital on equal terms with French capital. He made many business trips throughout European Russia and Siberia, studying railroads, waterways, principal business centers and key industries.

C. S. Roberts, after several years engaged in private business, has returned to the Bethlehem Steel Co., as assistant structural sales agent at Chicago.

Lewis V. Brown, president Star Furnace Co., Jackson, Ohio, died on Feb. 6 at his home in Athens, Ohio. He was born at Vinton Furnace, Ohio, June 13, 1858, and was graduated from Marietta College, immediately thereafter joining his father and his brother, Charles O. Brown, in the manufacture of iron at Jack-



W. C. HUNTINGTON

son. In 1910 he became associated with the Canaan Coal Co. at Canaanville, Ohio, with which he remained until the time of his death. Charles O. Brown is still associated with the Star Furnace Co., as is also a son of the deceased, Walter T. Brown.

Henry A. Klein, who designed and prepared for production the latest model for the Durant Motor Co., has resigned, effective Feb. 19, to become associated with the Eadie Trailer Corporation, 191 Ninth Avenue, New York. He will take charge of standardization of design and production of patented devices for trailers and other four-wheeled reversible tracking vehicles.

Cloyd M. Chapman has become affiliated with Dwight P. Robinson & Co., Inc., as consulting materials engineer. He has been active in the work of the American Society for Testing Materials and the American Concrete Institute and in the future will represent the Robinson company in the committee work of these societies.

W. C. Henderson, Jr., for the past 15 years secretary of the Bilton Machine Tool Co., Bridgeport, Conn., has become secretary and treasurer of the A. G. Leake Erecting Co., Bridgeport.

OBITUARY

CHARLES THEODORE BOYNTON, long a leading figure in Western iron and steel circles, died at his home in Highland Park, Ill., Feb. 27, following a brief illness with pneumonia. Mr. Boynton was active in directing the affairs of Pickands, Brown & Co. and the By-Products Coke Corporation, Chicago, having been vice-president and director of both companies. He was likewise a director of the Steel & Tube Co. of America and president and director of the North Shore Consolidated Gas Co. The diversity of his interests is indicated by the fact that he was also director of the Continental & Commercial National Bank, the Continental & Commercial Trust Co., the Grand Central Trust Co. of Illinois and The Buck & Raynor Co., a retail drug corporation, all of Chicago. Mr. Boynton was born Dec. 5, 1858, at West Stockbridge, Mass., and was educated in the public schools at Catskill, N. Y. He went to Chicago in September, 1879, and entered the employ of the Washburn & Moen Mfg. Co., of which he later became general Western manager. When that company was merged into the American Steel & Wire Co., he was appointed general sales agent. He resigned that position in 1900 to become president of the Shelby Steel Tube Co. In 1902 he became associated with Pickands, Brown & Co., with which company he remained until his death.

FRANK JANSON, manager Janson Steel & Iron Co., Columbia, Pa., died at his home in that city on Feb. 18. He was born in Columbia Aug. 7, 1855. Mr. Janson was prominent in the iron business for many years. After a common school education he learned the molding trade. In 1890 he founded the firm of Janson, Kasel & Co., which leased and operated for a while the Chickies Rolling Mill at Chickies, Lancaster Co., Pa., and engaged in the manufacture of muck bar. In August, 1893, he formed the Janson Iron Co., and built a merchant bar mill at Columbia. This he successfully managed until 1899 when the plant was sold to the Susquehanna Iron & Steel Co., and the property is now known as the East End Mill owned and operated by E. T. Edwards. In 1900 he founded the Janson Steel & Iron Co., which purchased the Oxford iron and nail plant at Oxford, N. J., and operated it for six years. Then being desirous of going back to his native home, he dismantled the Oxford plant and moved it to Columbia. He managed it successfully up to the time of his death. Mr. Janson is survived by his brothers, Joseph, president, and Valentine, treasurer, of the company.

CHARLEMAGNE TOWER, formerly managing director of the Minnesota Iron Co., and one time president of the Duluth & Iron Range Railroad, died on Feb. 24, at

Philadelphia, in his 75th year. Mr. Tower was a native of Philadelphia and graduated from Harvard in 1872. He was admitted to the Philadelphia bar in 1878. In 1882 he went to Duluth, where he was active in developing the resources of that region through his connection with the Minnesota Iron Co. He entered the diplomatic service in 1897 as minister to Austria-Hungary, becoming ambassador to Russia two years later. He was ambassador to Germany under President Roosevelt.

ARTHUR WINTHROP EARLE, formerly secretary and assistant treasurer of the Winchester Repeating Arms Co., died at his home in New Haven, Conn., on Feb. 16. He was born in New York in 1858 and studied at the Columbia School of Mines. Mr. Earle was on the staff of the Winchester company from 1883 until his retirement in 1919.

DAVID AUGUSTUS DECROW, manager of the water-works department of the Worthington Pump & Machinery Corporation, with which he had been affiliated for more than 40 years, died in East Orange, N. J., on Feb. 15.

Active Demand for Canadian Pig Iron

TORONTO, Ont., Feb. 26.—An active demand for second quarter pig iron has sprung up in the Canadian market during the past week. Melters who were holding back, awaiting new developments, have made their appearance in large numbers and some big tonnages have been booked by local blast furnace representatives within the past few days. One noticeable feature of the present booking by melters is that they are asking for larger tonnages in their contracts for second quarter than was the case for the first quarter of this year, and as a result local furnace representatives say that the demand for iron is exceptionally strong.

Last week the Algoma Steel Corporation, Sault Ste. Marie, Ont., blew in its No. 4 furnace, which will make basic iron for further use in the rail mill. No. 3 furnace is being relined and will be blown in as soon as this has been completed.

Prices have been advanced \$1 per ton, this increase going into effect on Feb. 22. Prices are now as follows: No. 1 (2.25 to 2.75 silicon), \$34.55; malleable, \$34.55; No. 2 (1.75 to 2.25 silicon), \$33.55, Toronto. Montreal prices are: No. 1 and malleable, \$36.90; No. 2, \$35.90; Summerlee and Carron, \$33 to \$35 per ton.

Canadian Scrap Market

TORONTO, Feb. 27.—The Canadian iron and steel scrap metal market has not improved to the same extent as have the pig iron and iron and steel markets, but local dealers are optimistic and say that business for the future looks good. Steel plants and foundries are showing renewed interest in their requirements which has resulted in a slightly better tone in such materials as heavy melting steel, turnings, machinery cast and stove plate, but in other commodities little activity is reported.

Dealers' Buying Prices.

	Gross Tons
Bundled sheet	\$4.00
Hydraulic compressed sheets	5.00
Wrought pipe	6.00
Heavy axle turnings	6.00
Machine shop turnings	6.00
Flashings	6.00
Cast borings	7.00
No. 2 Busheling	5.00
Boiler plate	9.00
Steel turnings	9.00
Heavy melting steel	11.00
Rails	11.00
No. 1 wrought	11.00
Steel axles	16.00
Axes, wrought iron	16.00
Car wheels iron	16.00
	Net Tons
Malleable scrap	10.00
Stove plate	14.00
Standard car wheels	14.00
No. 1 machinery cast	18.00

British Iron and Steel Market

Pig Iron and Finished Steel Advance Sharply on Higher Costs—Tin Plate and Sheets Strong—Continental Markets Dead

(By Cable)

LONDON, ENGLAND, Feb. 27.

Pig iron markets are displaying increasing strength, with an acute scarcity of most grades, and many makers are unwilling to quote on any definite shipment promise. The domestic demand consequently is decreasing, but there is an increasing demand from the Continent. Hematite is strong, with prices talked still higher. There is a large amount of buying on the part of domestic consumers and moderate sales for export. Makers are well sold until the end of April.

Foreign ore is firm. Sellers of best Bilbao Rubio ask 25s. (\$5.88), c.i.f. Middlesbrough.

Steel plants are now fairly well booked up and steel makers are disinclined to quote for forward delivery, owing to uncertainties as to future costs. Prices generally are all tending upward.

Germany is inquiring for shipbuilding materials. Japan has bought fair quantities of No. 5 gage wire rods. India is inquiring for Continental specifications.

Continental business is almost dead. There have been no further furnaces reported banked, but the position is becoming more complicated, owing to the French imposition of a Ruhr export tax.

Czechoslovakia has sold wire rods at £10 5s. (\$48.18), f.o.b. Sellers are now asking up to £11 (\$51.70) f.o.b. Czechoslovakian merchant bars are being offered at £9 5s. (1.94c. per lb.), f.o.b., but buyers are reluctant.

Tin plate is strong on higher steel and tin and is now being talked up to 23s. (\$5.41), basis i.e., f.o.b. Sellers generally are asking 22s. (\$5.17) and upward.

There is substantial domestic and export demand, owing to anticipation of higher prices.

Black sheets are dearer, on account of rising costs. Japanese specifications are being sold at £19 (3.99c. per lb.), f.o.b., for July and August delivery.

Galvanized sheets are steady, with moderate demand for thick gages, but good business for thin gages for the Eastern markets. Japan is inquiring, but no business has been reported.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.70 per £1, as follows:

Durham coke, delivered	£1 17 1/2 s. & £3 15 s.*	\$8.81 & \$17.63*
Cleveland No. 1 foundry	6 0	28.20
Cleveland No. 3 foundry	5 17 1/2	27.61
Cleveland No. 4 foundry	5 12 1/2	26.44
Cleveland No. 4 forge..	5 7 1/2	25.26
Cleveland basic	5 17 1/2	27.61
East Coast mixed....	5 12 1/2	26.44
Ferromanganese	16 0	75.20
Ferromanganese*	16 0	75.20
Rails, 60 lb. and up...	8 15	to 9 0
Billets	8 0	to 9 0
Sheet and tin plate bars,		
Welsh	8 1	to 8 11
Tin plates, base box...	1 1 1/2	to 1 2 1/2
		5.05 to 5.29
		C. per Lb.
Ship plates	9 0	to 9 10
Boiler plates	11 0	to 11 10
Tees	10 0	to 10 10
Channels	9 5	to 9 15
Beams	9 0	to 9 10
Round bars, 3/4 to 3 in.	10 10	to 11 0
Galvanized sheets, 24 g.	19 0	to 19 5
Black sheets, 24 gage..	13 10	2.83
Black sheets, Japanese		
specifications	15 5	3.20
Steel hoops	11 0	& 12 10*
Cold rolled steel strip,		
20 g.	23 0	4.83
Cotton ties, Indian specifications	15 0	3.15

*Export price.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

No quotations.

Group Drives and Direct Connected Motors

Concluded from page 627

mission but a few minutes instead of weeks, and the work is done by comparatively cheap labor at hand, rather than sending outside for expensive experts.

The leather belt, too, as compared with the motor, has a long life. Where properly designed, leather belts run indefinitely. There are numerous cases of belts which have run as much as fifty years, and thirty and forty years are quite common. This applies, of course, to large main driving belts, but even the smaller machine belts run for a good many years, doing their allotted duty at a minimum of cost.

Any comparison of this kind must be based on the presumption of good quality belting. Since Mr. Taylor's time much has been done to standardize qualities in belting, as well as to improve them, and now we have the new federal specifications for leather belting, which will go much further in this direction. These specifications, providing definite and specific tests which will secure to the careful buyer a high measure of quality, have been prepared through committees from the Leather Belting Exchange and the United States Bureau of Standards, and from a definite step toward the standardization of quality in leather belting.

Leather belting now can be purchased from most of the leading houses under a guarantee that it complies literally with the terms of these specifications, and those who care to do so can apply the tests provided therein and determine for themselves the quality of the purchase. By buying the federal specification belting from reputable houses who will guarantee it, much of the trouble heretofore experienced in leather belting will be avoided. Federal specification belting can be made and sold at the prices which are being asked for

the better qualities now on the market, but naturally will cost more than those qualities in which inferior stock has been used.

With exception of the semi-obsolete blast furnace at Niles of the Carnegie Steel Co., idle for several years, all stacks in the Mahoning Valley are now in commission. The last to be blown in was the Tod furnace at Youngstown of the Brier Hill Steel Co., idle several weeks, during which it was relined and overhauled.

COMING MEETINGS

April

Society of Industrial Engineers. April 18 to 20. Spring convention, Cincinnati. George C. Dent, 327 LaSalle Street, Chicago, business manager.

American Gear Manufacturers' Association. April 19 to 21. Annual meeting, Hotel Cleveland, Cleveland. T. W. Owen, 2443 Prospect Avenue, Cleveland, secretary.

National Foreign Trade Council. April 25 to 27. Annual convention, New Orleans, La. O. K. Davis, 1 Hanover Square, New York, secretary.

American Foundrymen's Association. April 28 to May 3. Annual convention and exhibition, Public Hall, Cleveland. C. E. Hoyt, 140 South Dearborn Street, Chicago, secretary.

National Metal Trades Association. April 16 to 19. Twenty-fifth annual convention, Hotel Astor, New York. L. W. Fischer, Peoples Gas Building, Chicago, secretary.

BOOK REVIEWS

The Flow of Gases in Furnaces. By W. E. Groumet-Grjimailo. Translated from Russian into French by Leon Dlougatch and A. Rothstein, with a preface by Henry Le Chatelier; translated from the French by A. D. Williams. With an appendix upon the design of open-hearth furnaces. Pages 399 + xxi, 5 $\frac{1}{4}$ x 9 in.; figures 194. Published by John Wiley & Sons, Inc., New York. Price \$5.50.

Somewhat less than half this book is devoted to the main topic, for the appendices, 10 in number, occupy 242 pages. Portions of the material have been published in *THE IRON AGE* from time to time as they became available, these portions covering particularly different types of furnaces and discussions of their applicability to different purposes. Such articles are included in the following list, which is given for convenience in reference:

- Design of Open-Hearth Furnaces, Jan. 1, 1920, page 35.
- Design of Open-Hearth Furnaces, Jan. 8, 1920, page 119.
- Design of Open-Hearth Furnaces, Jan. 29, 1920, page 317.
- Design of Open-Hearth Furnaces, Feb. 12, 1920, page 475.
- Design of Open-Hearth Furnaces, March 18, 1920, page 805.
- Design of Open-Hearth Furnaces, April 29, 1920, page 1225.
- Design of Open-Hearth Furnaces, May 27, 1920, page 1510.
- Design of Open-Hearth Furnaces, Aug. 5, 1920, page 319.
- Design and Proportions of Hot Blast Stoves, June 9, 1921, page 1527.
- Heat Distribution in Hot Blast Stoves, June 16, 1921, page 1613.
- Designing Hot Blast Stoves, June 23, 1921, page 1677.
- Continuous Heating Furnaces for Steel, Aug. 24, 1922, page 465.
- Regeneratively Fired Heating Furnaces, Aug. 31, 1922, page 537.
- Pit Reheating and Soaking Pit Furnaces, Oct. 19, 1922, page 1013.

While the general theme is theoretical, and much reliance is placed upon mathematics, yet the whole work is checked up with practical operation of steel mill units. The main part of the book is devoted to the application of the laws of hydraulics to reverberatory furnace design, and to the principles of construction of various types of furnaces and units for transfer of heat, such as the hot blast stoves, cementation, annealing, tempering and reheating furnaces, kilns and pit furnaces. The book is concerned almost wholly with ferrous furnaces rather than with those designed for the non-ferrous metals.

Because of its Continental origin, the entire work is based upon the metric system of measurements. In some cases, particularly in the appendices, the units in common use in the United States and Great Britain have been introduced alongside their metric equivalents, which will make the work much more readily usable by the English speaking metallurgical world.

In his preface to the French edition, Henry Le Chatelier credits the author with setting forth a very simple principle in regard to the circulation of the hot gases within furnaces, which has not heretofore been recognized. "We have always considered," he writes, "that gases, by reason of their absolute elasticity, completely fill the chamber in which they are inclosed. Then, by a process of unconscious induction, we conclude [wrongly] that in circulating through a series of successive chambers of the flues they fill equally the entire chambers, and that their current sweeps uniformly through passages or flues open to them, in proportion to the sectional area of those passages. The author cites numerous examples of these errors. * * *

"Not content with having developed these new ideas, the author has endeavored to place them before his readers in a manner which will make them absolutely clear, just as he has been doing for a long time in the

instruction of his classes [at the Polytechnic Institute of Petrograd]. To present in a visible manner the circulation of hot gases within the furnaces, he has employed small models of furnace sections, inclosed between two plates of glass, and within these models he has circulated two liquids of different densities, water serving as the heavier liquid and colored kerosene as the lighter liquid, representing the hot gases or flame. The localization of the current of kerosene shows clearly whether the furnaces are of poor or good design."

Except in depicting some of the model furnaces just mentioned, which of course is done in half tone, nearly all of the illustrations are line cuts. They illustrate furnace designs, particularly in arrangement and construction of the passages through which the hot gases flow. Furnace ports and working areas are covered in great detail, both by themselves and with relation to each other and to the other features of furnace design, which go to make up a complete unit. Diagrammatic representation of the characteristics of different forms of gaseous fuels are given careful attention, special stress being laid upon the variation in these characteristics as the amount of air, mixed with the fuel, increases beyond the quantity theoretically necessary for perfect combustion.

Altogether the book is full of meat for the student of metallurgical furnaces and is not to be digested in a short time.

Car Builders' Encyclopedia. Tenth edition, 1922. Compiled and edited for the American Railway Association by Roy F. Wright and Charles N. Winter. Pages 1192, 8 $\frac{1}{4}$ x 11 $\frac{1}{2}$ in. Figures 3101. Published by Simmons Boardman Publishing Co., Woolworth Building, New York. Price \$8.

From the dictionary of terms occupying the first 100 pages to the index in three parts at the rear of the book, this is packed full of data on the design and construction of railroad cars and all of their multitudinous details. The numerous illustrations running through the book average almost three per page. This volume, however, differs from previous editions in that it has been transformed from the illustrated dictionary type to that of the cyclopedia. The data have been compiled in a manner differing radically from previous editions, all information relating to a specific subject being grouped within a single chapter, instead of being scattered and arranged according to the individual topic. This obviates the necessity for continual cross reference and avoids the inconvenience formerly inseparable from obtaining complete information on any subject.

Since publication of the 1919 edition there have been developed many new designs of cars and appliances, which has made it possible to place in this edition much more up-to-date and complete information regarding the latest practice in American car building than was before available. The new edition omits reference to the standardized railroad cars designed by the United States Railroad Administration, and also the equipment used by the American Expeditionary Forces in France, both being now of academic interest, only.

The general subject of freight cars occupies more than 180 pages. Cars for passenger trains take up 80 pages; details of car construction, both freight and passenger, including everything from the trucks on which the cars ride to the lighting, heating and ventilating systems, takes up almost 600 pages in the middle of the book. Specifications of various organizations which have governed the construction of cars are given in some detail, safety appliances being shown according to the American Railroad Association standards. One chapter is devoted to the construction of cars for use on foreign railroads, the differences in type and general appearance from American cars being in many instances noteworthy.

Economical combustion of waste fuels has been made the subject of a special study by David Moffat Myers, consulting engineer, and the report is now available in technical paper No. 279 of the Bureau of Mines. Waste fuels are broadly defined as combustible material result-

ing as a by-product of manufacture, and there are two distinct classes: auto-combustibles, so-called, which maintain their own combustion after ignition, and combustibles which will not burn without the aid of an outside source or without mixture with an auto-combustible. The latter are called semi-combustibles. The pamphlet is obtainable from the superintendent of documents, Government Printing Office, Washington, at 10c. a copy.

Sampling and Analysis of Coal, Coke and By-Products. Methods of the chemists of the United States Steel Corporation. Pages 184, 5 x 7½ in. Published by the Carnegie Steel Co., Bureau of Instruction, Pittsburgh. Price, \$3.

The second edition of this valuable book has recently appeared and reflects the notable advances which have been made in handling coal and its derivatives. The rapid growth of the by-product coke industry since the publication of the original book has occasioned many changes in laboratory methods. As a result, in this new edition the old methods are rewritten. The chief chemists of the constituent companies of the United States Steel Corporation cooperated in this elaboration and the book is issued under the copyright of J. M. Camp, as chairman of the committee.

Several new features have been added. The most important of these are physical tests on coal and coke, quality of ash and the methods of determining sulphur according to the way it exists in coal. Another important change deals with the progressive dry distillation method for the analysis of coal, a method improved to give results that compare more nearly with plant practice, especially in the matter of benzol yield. It should commend itself anew as a satisfactory method for the evaluation of coal and its by-products.

New Books Received

The Twelve-Hour Shift in Industry. By the Committee on Work-Periods in Continuous-Industry of the Federated American Engineering Societies. Pages 302, 5½ x 8½. Published by E. P. Dutton & Co., 681 Fifth Avenue, New York. Price, \$3.50.

Briquetting. By Albert L. Stillman. Pages 466, 5¾ x 8¾ in., illustrations 159. Published by the Chemical Publishing Co., Easton, Pa. Price, \$6.

Engineering Economics. By John Charles Lounsbury Fish. Pages 311, 5¾ x 9 in.; numerous charts. Second edition. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$8.

Year Book of the American Iron and Steel Institute, 1922. Pages 566, 6 x 9 in.; illustrated. Published by the American Iron and Steel Institute, 40 Rector Street, New York.

Oxy-Acetylene Welding and Cutting. By P. F. Willis. Pages 254, 4 x 6 in.; illustrations, 90. Sixth edition. Published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, \$1.50.

The Principles and Practice of Toothing Gear Wheel Cutting. By G. W. Burley. Pages 311, 6 x 9 in.; illustrated. Published by D. Van Nostrand Co., 8 Warren Street, New York.

Some Problems in Current Economics. By M. C. Rorty. Pages 143, 5 x 7½ in.; several charts. Published by A. W. Shaw Co., Cass, Huron and Erie Streets, Chicago. Price, \$1.25.

Machinery Foundations and Erection. By Terrell Croft, editor. Pages 691, 5½ x 8 in.; illustrations, 73. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$5.

Optical Methods in Control and Research Laboratories. By J. N. Goldsmith, S. Jugg Lewis and F. Twyman. Pages 56, 6 x 9¾ in.; illustrated. Published by Adam Hilger, Ltd., 75A Camden Road, London, N. W. 1, England. Price, 1s. 6d.

NEW TRADE PUBLICATIONS

Welding Machines.—U. S. Electric Welder Co., Cleveland. Bulletin No. 23, two pages, outlines features of type S. A. F. machine and transformer. Dimensions are given.

Power Pumps and Working Heads.—F. E. Myers & Bro. Co., Ashland, Ohio. Catalog SOP-23, 48 pages, 6 x 9 in. Describes the company's line of self-oiling bulldozer power pumps for shallow well and deep well pumping. Illustrations show the equipment in various uses and sectional and detail views of the several sizes. The Myers self-oiling bulldozer working heads, self-lubricating pump jacks and working barrels are other items included. Suggestions and rules applicable to pumps and price lists are given.

Brakes.—Electric Controller & Mfg. Co., Cleveland. Bulletin 1003-A, 8 pages, devoted to type Q brakes, for cranes and other hoisting apparatus and electrically driven machinery. The two styles available, form F and form BF, one of which is magnetically operated and the other mechanically, are described and illustrated in half tones and sectional views. A table of ratings, outline dimensions and weights for various sizes is included.

Air-Operated Chucks.—Logansport Machine Co., Logansport, Ind., Catalog R-15. Devoted to air-operated chucking equipments for turret lathes and production machines, several adaptations of the component units as adapted to various makes of turret lathes, being illustrated and described. The catalog section gives detail views and information on the company's reducing valve and automatic lubricator, and also chuck drilling vise, compensating collet chucks, all of which are air operated. Double acting air cylinders and special air-operated equipment are also included. The size is 9 x 11 in., 30 pages.

Drop Forged Chain.—Brown Hoisting Machinery Co., Cleveland, Catalog L 1922, 12 pages, describes various sizes and types of the company's drop forged chain for conveyors and elevators. Illustrations show the component elements of the chain and various attachments. Dimensional sketches of the chain are also given.

Automatic Rotary Furnace and Quenching Tank.—W. S. Rockwell Co., 50 Church Street, New York. A 2-page folder 8½ x 11 in., illustrating and describing a combination of a rotary furnace for heating materials as they successively progress along the length of the tank through the medium of spiral grooves and an automatic quenching tank. The materials pass through the quenching tank, again by spiral grooves, which carry them out and deliver them into tote boxes for removal. The continuous moving of the material in the circulating fluid is designed to insure uniform cooling. Control of the rate of rotation of both furnace and quenching tank permits giving the material any length of treatment desired. Both units are designed for the heat treating of small metal pieces of such shape that they will readily progress as the apparatus is rotated.

Electric Motors.—Louis Allis Co., Milwaukee. Bulletin No. 406, outlining mechanical details, including end frames and shields, bearings, lubrication, rotor, stator and other components of the new HD heavy duty motor. The make-up and illustrations are unusually attractive. The size is 8½ x 11 in., 16 pages.

Thor Pneumatic Safety Rivet Buster.—Independent Pneumatic Tool Co., Chicago. A 4-page leaflet describing a pneumatic tool for cutting off rivet heads and backing out rivets. The tool may be used by one man, and instructions for its use are carried on the last page.

Grinding and Pulverizing.—Hardinge Co., 120 Broadway, New York. Catalog No. 13, replete with illustrations and tables devoted to the grinding and pulverizing mills for both wet and dry grinding processes. Besides giving an insight into the development which has occurred in the last three years, the character of the illustrations is calculated to make it easy to understand the principles applied in the grinding operations.

Foundry Equipment.—J. W. Paxson Co., Philadelphia. An 8-page folder illustrating equipment for foundry use, including bottom discharge crane ladles, the Paxson-Colliar cupola and details of the cupola and its lining. This cupola is said to be particularly useful in providing hot iron.

Electric Furnaces.—Booth Electric Furnace Co., 411 North Wells Street, Chicago. Leaflets describe with illustrations special furnaces having electrodes which can be changed from the vertical to the horizontal position. They are made from 1-lb. to 100-lb. capacity.

STEEL AND INDUSTRIAL STOCKS

Advance of New York Federal Reserve Rate an Important Feature of the Week

Market opinion has become universally bullish in steel and industrial stocks, the few notable recessions being waved aside by the belief that they were only corrective steps. Then, too, industrials were a stride ahead of the general market rise. But great precautions are taken, for the thought abounds that these reactions are the sign of the second stage in a bull drive, hence, that there may be a greater potential strength yet to be revealed. Some skeptics looked to Baldwin's strength as an index to a turn in the market. Interest was lagging and things were dull on Tuesday when American Can jumped to the highest price in its history, outwitting those who were caught on the short side. Progress halted Friday with the unforeseen rise in the New York Federal Reserve Bank's rediscount rate, attested to be an "evening up" with other reserve banks but taken by many to reflect increased inland trade and consequent pressure on credit demands; it looks, too, like a curb and a warning to wild speculation.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalmers...	49 1/2	51	Gulf States Steel	89 1/2	96
Allis-Chal. pf...	96 1/2	97	Inland Steel...	46 1/2	47 1/2
Am. B. S. & F. Fdy.	76 1/2	79	Int. Har.	92	96 1/2
Am. B. S. & F. pf. 110			Int. Har. pf...	114 1/4	114 1/4
American Can...	95%	100 1/2	Lima Loco...	66 1/2	69 1/2
Am. Can pf...	114	115	Midvale Steel...	29	30 1/2
Am. Car & Fdy.	182	184	Nat.-Acme...	15	18 1/2
Am. C. & F. pf. 125%			Nat. Enam. & St.	68 1/2	69
Am. Locomotive	124 1/2	128 1/2	Nat. E. & St. pf. 101	102	
Am. Loco. pf...	121	122	N. Y. Air Brake.	35	37 1/2
Am. Radiator...	81 1/2	83 1/2	Nova Scotia Stl.	29	
Am. Radiator pf...	123	123	Otis Steel...	11 1/2	11 1/2
Am. Steel Fdries.	38	39	Otis Steel pf...	63	65
Am. Stl. Fd. pf. 104%			Pitts. Steel pf...	94	
Baldwin Loco...	137 1/2	141 1/2	Pressed Stl. Car	64	66 1/2
Bald. Loco. pf.	114 1/2	114 1/2	Pressed Stl. pf...	92	
Bethlehem Steel...	63 1/2	65	Ry. Steel Spring.	114 1/2	116
Beth. Stl. Cl. B.	65 1/2	67	Repligie Steel...	28 1/2	31 1/2
Beth. Stl. 8% pf. 109%			Republic...	56	58
Beth. Stl. new...	95 1/2	96 1/2	Republic pf...	93 1/2	93 1/2
Brier Hill....	18 1/2	18 1/2	Sloss...	49	50 1/2
Br. Em. Steel...	9 1/2	10 1/2	Steel of Canada.	71	75
Br. Em. Stl. 1 pf.	68 1/2	68 1/2	Transue-Williams	34 1/2	35 1/2
Br. Em. Stl. 2 pf.	26 1/2	26 1/2	Un. Alloy Steel.	35 1/2	36 1/2
Cambridge Steel...	42		U. S. Pipe...	31 1/2	33
Chic. Pneu. Tool	86 1/2	88 1/2	U. S. Pipe pf...	71	72
Colo. Fuel...	29 1/2	30 1/2	U. S. Steel...	107	108 1/2
Crucible Steel...	78 1/2	81 1/2	U. S. Steel pf...	120	121
Crucible Stl. pf.	93 1/2	94	Vanadium Steel.	41 1/2	44
Deere pf...	72	73	Va. I. C. & Coke	55 1/2	57
Gen. Electric...	185	187	W'house Air Br.	117 1/2	119 1/2
Gt. No. Ore Cert.	33 1/2	33 1/2			

Receiver for Ryan Bohn Foundry Co.

Appointment of a receiver for the Ryan Bohn Foundry Co., Lansing, Mich., has been asked of the Ingham County circuit court. This company was organized in January, 1920, with an authorized capitalization of \$2,000,000 to be issued \$1,250,000 in common stock and \$750,000 in preferred, for the purpose of manufacturing gray iron castings. Operations were begun in September, 1920. The present situation has been reported as being due principally to several large contracts on hand for castings which were made when materials were low. According to the report filed with the court, the company has \$2,000 cash on hand and less than \$50,000 in accounts receivable. Liquidated liability, in excess of stock liability amounts to \$685,823.24 with the physical assets of the company, including land, amounting to \$1,159,360.46. Officers of the company are: Edward Ver Linden, president and treasurer; D. J. Ryan, vice-president; E. C. Shields, secretary.

Industrial Finance

In the consolidated report of the Baldwin Locomotive Works for the year ending Dec. 30, 1922, a net profit of \$5,206,519 is shown, after taxes, depreciation and deferred profits. Sales totalled \$83,087,259 and the manufacturing profit was \$1,994,361. President S. M. Vauclain told the stockholders that "the period of readjustment continued during the major portion of the year. The general business of the country greatly increased, and during the last few months a satisfactory business was secured. Your property, having been maintained in a creditable manner, is fully prepared for the improved situation which will characterize the coming year."

Deere & Co. reports for the year ended Oct. 31, 1922, a deficit after charges, taxes and depreciation of \$2,520,779, as compared with the deficit of \$2,752,801 in the previous year.

The Billings & Spencer Co., Hartford, Conn., drop forgings, plans in the near future a \$600,000 bond issue. Details

are lacking. The present indebtedness of the company is approximately \$1,000,000 in short term notes. The quick assets are something like \$1,180,000. With the proposed financing the short term notes presumably will be eliminated. The concern is booking business at the rate of about \$8,000 per day.

A voluntary petition in bankruptcy has been filed in the Federal Court at Milwaukee by the Winther Motors, Inc., Kenosha, Wis., which recently was made defendant in receivership proceedings in the Kenosha County Circuit Court. Judge Clifford E. Randall of Kenosha, appointed receiver by the Kenosha Court, is continued in this capacity in the Federal proceedings. The Winther company admits liabilities of \$655,034 and claims assets of \$1,038,722.

The Gulf States Steel Co. shows in its 1922 report a net profit of \$958,207, after charges and Federal taxes, against a net loss of \$591,915 in 1921. This amounts to \$7.26 per share on its common stock. Gross profits were \$1,406,083, against an operating loss of \$242,921 in 1921.

The Pittsburgh Rollis Corporation showed net profit in its 1922 report of \$208,546, after taxes and interest. Surplus available for general purposes as of Jan. 1, 1923, was \$313,728.

Industrial News Items

The Penn Metal Co., Boston, has purchased the New England steel rod and bar business of the Midvale-Cambric Co., including all machinery, tools and merchandise. The Boston plant of the Midvale Company will be operated by the Penn Metal Co. until such time as the latter company's new bar and rod plant is completed. The list of steel shapes fabricated includes plain and deformed bars, plain rounds, rods, angles, cold drawn steel, spirals for concrete columns.

During the two weeks prior to Feb. 12, the General Electric Co. booked more than \$14,000,000 of business. Included in this amount was \$1,500,000 car equipment for the Philadelphia Rapid Transit Co.

The Saco-Lowell Shops, Boston, textile machinery, with plants at Newton and Lowell, Mass. and Biddeford, Me., is operating at slightly better than 80 per cent of capacity, with unfilled business on its books of more than \$5,000,000.

The New Departure Mfg. Co., Bristol, Conn., ball bearings, etc. is employing more than 100 per cent than a year ago. Of those employees taken on during the past year, 82 per cent formerly worked for the company.

Two Springfield, Ohio, companies are running three nights a week to meet the demands of the trade. One is James Leffel & Co., manufacturers of turbines and steam engines, and the other is the Kelly-Springfield Motor Truck Co. Both companies have also added a number of men to their forces recently. President A. F. Sparks, of the Leffel company, says orders are being booked and that the outlook is bright for the future. Pearl A. Lewis, receiver for the Kelly-Springfield company, states that orders are exceeding production.

The plant at Canton, Ohio, which was purchased by the Falcon Tin Plate Co. from the Carnahan Sheet & Tin Plate Co., has been shut down since December in order to make extensive improvements in equipment. The Falcon Tin Plate Co., whose home office is at Niles, Ohio, expects to resume operations April 1 and will manufacture coke tin plate, full finished black plate, enameling stock and black plate specialties.

The North plant of the National Conduit & Cable Co., Inc., Hastings, N. Y., will be offered at receiver's sale on the premises on March 9. While the plant manufactured sheet brass, it is stated that it can readily be adapted to a variety of manufacturing purposes.

The General Motors Corporation has announced that the recent purchase of the Milburn Wagon Works, Toledo, Ohio, was made in accordance with an arrangement with the Fisher Body Corporation. Manufacturing of bodies in the Milburn plant is dependent upon the necessity of the Fisher company for additional facilities.

The Automotive Utilities Corporation of Michigan, a new company organized for the purpose of manufacturing special wheel and axle equipment for Fordson tractors and automobile trucks, has been merged with the Automotive Utilities Corporation of America. Officers of the company are: T. T. Hollinger, president; A. R. Thomas, vice-president, treasurer and general manager; R. T. Yeats, secretary; E. W. Soleau, assistant secretary-treasurer.

As part of its expansion program the Columbia Steel Corporation has acquired title to 3220 acres of coal lands in Carbon County, Utah, valued at \$740,000. This property is contiguous with a rich bituminous coal and coking region and according to estimations it embraces around 90,000,000 tons of coal. The company has been authorized to dispose of \$185,000 in bonds and is expected to expend about \$250,000 in opening the mine for commercial production by the close of the year.

The American Metal Products Co., Milwaukee, manufacturer of Ampco, a copper aluminum steel alloy of high tensile strength and acid resisting, reports an increase of 400 per cent in its business over the previous year. It has installed a Detroit electric rocking type furnace. By spring, it will have installed a new rolling mill electrically driven, five sets of housings, three rolls high—a 10-in. mill—to roll sheets, strips, rods, etc. It also contemplates the installation of a wire drawing equipment.

The Shunk Mfg. Co., Bucyrus, Ohio, has closed negotiations with S. Franklin Henderson, owner of patents on the Henderson motor truck hoist, to manufacture the product in the Allen plant at Bucyrus. Special dump and box bodies of steel will also be built. John Q. Shunk of the Shunk company stated last week that actual production should be started within two months. Plans are now being made for installing new machinery and a new furnace is being put in. Benton Hopkins of Cleveland has been appointed superintendent of the plant.

At the annual stockholders' meeting of the Smith & Davis Mfg. Co., St. Louis, the following directors were elected: Jacob Chasnow, J. D. Perry Francis, James C. Harvey, William E. Hoblitzelle, A. C. Lueking, J. Sheppard Smith, and Judge Daniel G. Taylor. The directors in turn elected the following officers for the ensuing year: William E. Hoblitzelle, president; James C. Harvey, vice-president; Henry Knickmeyer, vice-president; Harry C. Josephson, secretary, and J. K. Murphy, treasurer.

An initial dividend of \$1 per share on the no par common stock was declared payable March 1, and in addition to the regular preferred dividends, there was retired \$5,000 of the preferred stock.

Plans of New Companies

The Thompson Air Spring Corporation, 79 Fifth Avenue, New York, has been incorporated with capital stock of \$75,000 to manufacture mechanical springs and spring devices. It will supplant the Thompson Air Spring Co. which has been working on a patented pneumatic spring for nearly two years. Manufacturing will be done entirely by contract, the company acting merely to assemble and inspect. Products for the time being will be handled exclusively by distributors of large and medium size cars. The principals are: L. I. Thompson, D. I. Cooke, and B. M. Asch.

The Curtis Gas Engine Corporation, New York, has been incorporated with capital stock of \$300,000, to manufacture gas engines and parts. Activities for a time will be centered on matters of organization. The incorporators are: C. G. Curtis, 2 Rector Street, New York; S. S. Wheeler, and E. R. Newton.

The California Cyanide Co. has been formed jointly by Los Angeles capitalists and the Air Reduction Co., Inc., 342 Madison Avenue, New York, to manufacture liquid hydrocyanic, sodium cyanide and kindred products. Steps have been taken by the two groups involved to raise a total of \$1,000,000 of working capital and it is understood that work on a new plant will be started immediately. F. W. Braun is president; John Pike is vice-president and general manager; J. D. Neuls is in charge of field service. C. E. Adams, president, Air Reduction Co., is one of the directors.

The Goss-Stade Corporation, New York, has been incorporated with capital stock of \$100,000 to manufacture automobile equipment and accessories, the chief item among which is a vacuum tank. The next step in organization will be to locate a plant and to obtain the necessary equipment. Initial production will be at the rate of between 500,000 and 1,000,000 tanks per year, hence buildings of some size will be required. Operations will begin immediately upon finding a location. John Grimm, vice-president Guaranty Trust Co., New York, is president; H. T. Goss of the firm Goss & Johnson, engineers, New York, is vice-president; C. E. Stade, secretary; and F. H. Cozens of the Cozens Trading Co., tractors, is treasurer.

The Holland Maid Co., Holland, Mich., capitalized under Michigan laws at \$400,000, is a reorganization of the Holland Mfg. Co., that city, a copartnership manufacturing electric washing machines. Total assets of the old company, including land, buildings and machinery, have been purchased by the Holland Maid Co., which will include ironing machines among the products manufactured. The officers are: President, A. H. Landwehr, treasurer and general manager Holland Furnace Co., Holland; vice-president, D. J. Diekema; treasurer and general manager, Carl E. Gschwind; secretary, R. M. Bosworth.

Since the sale of the Pond Creek Coal Co. to Henry Ford, associated interests have organized a new company known as the Pond Creek Pocahontas Co., and have acquired 2500 acres of coal-bearing lands in McDowell County, W. Va., according to the bankers. The property, it is said, will be

equipped for an approximate capacity of 750,000 tons annually. Hayden, Stone & Co., New York, have offered privately a block of approximately 50,000 shares of stock at the same price quoted to those interested in the management. The authorized stock consists of 125,000 shares, no par value. The executives are: T. B. David, president; J. D. Francis and R. S. McVeigh, vice-presidents; and F. W. Batchelder, secretary-treasurer.

Webster-Inglis, Ltd., 14 Strachan Avenue, Toronto, Canada, has been formed as an extension of the Webster Mfg. Co., Chicago and Tiffin, Ohio, engineers, founders and machinists. Facilities at the Canadian plant will enable it to manufacture elevating, conveying and power transmission machinery along the same lines as the Webster Mfg. Co.

The Brass City Electric & Battery Co., 452 Meadow Street, Waterbury, Conn., recently incorporated to manufacture electric power equipment and parts, naming authorized capital at \$25,000, states that activities will consist mainly of electrical repairs to automobile generators and starters. Equipment has been purchased sufficient for present needs. The incorporators are: C. F. Hollister, manager; R. F. McLean and W. H. Roden.

The Goshen Lightning Rod Co., Goshen, Ind., has been incorporated with authorized capital of \$150,000, to manufacture lightning rods and other mechanical equipment. It takes over the business of a co-partnership active since 1909. Its present facilities include a fully equipped plant erected in 1915. A. G. Hoovens heads the company. Manufacturing will be conducted as previously.

The Clark-Celfor Tool Co., Buchanan, Mich., has been incorporated with a capitalization of \$50,000 for the purpose of manufacturing tools and machinery for the automotive industry. The new company is an offspring of the Clark Equipment Co. of the same city, the officers of the new organization being identified with the Clark Company.

Trade Changes

The Valve Engineering Co., Mystic Avenue, Somerville, Mass., steam traps and specialties, has moved plant and office to 66-72 Hamilton Street, Cambridge, Mass.

The Murlin Mfg. Co., Inc., electrical fittings and parts, 1839 Wylie Street, Philadelphia, has moved into its new building at 5420 Paschall Avenue, West Philadelphia.

The Dean Brothers Steam Pump Works, Indianapolis, commencing March 1, will change its name to Dean Brothers Co.

J. E. Robertson & Co., El Paso, Texas, announce that F. Wagner, formerly of Williams & Wagner, manufacturers' agents, has become associated with the Robertson company. Among some of the manufacturers that the company represents in the Southwest and Mexico are the following: New York Belting & Packing Co., Ludlow-Saylor Wire Co., Johnathan Bartley Crucible Co., Fisher Leather Belting Co., Federal Belting Co., Logan Coal Co., Wyoming Shovel Co., Brier Hill Steel Co., Chicago Perforating Co., Filter Fabrics Co., Goheen Corporation, and the H. H. Robertson Co.

The C. D. Mapes Co., steels and tubing, 207 Market Street, Newark, N. J., after March 1, will be located at 227 High Street, that city.

The Syracuse Supply Co., Syracuse, N. Y., has been appointed exclusive agent by the Foster Machine Co., Elkhart, Ind., for screw machines, turret lathes and tools.

The general sales office of the Cutler Steel Co., manufacturer of Duraloy, has been transferred from 50 Church Street, New York, to the Bowman Building, Pittsburgh. W. H. Waddington, vice-president in charge of sales, will make his headquarters at this address.

The Cooley-Wright Mfg. Co., Waterbury, Vt., has been appointed distributing agent for Globe HC chilled shot in Maine, New Hampshire, Vermont and Northern New York. It also carries cutting tools, machinery and supplies for stone workers.

The Columbia Steel Co., Elyria, Ohio, has opened a district sales office for Michigan at 618 Book Building, Detroit. H. U. Van Leyen has been appointed manager of sales.

Mitsui & Co., Tokio, have been appointed exclusive representatives in Japan and China for Uehling CO₂ recording equipment and other power plant instruments of the Uehling Instrument Co., Paterson, N. J. The New York branch office of the Mitsui company is at 65 Broadway. The Uehling company also has appointed as agent John E. Arnold, 15½ South Fourth Street, Tulsa, Okla., whose territory is Oklahoma, and H. R. N. Johnson, 917-A Marquette Avenue, Minneapolis, whose territory is Minnesota, North Dakota and South Dakota.

Pilling & Co., Inc., New York and Philadelphia, pig iron, have established a New England office at 200 Devonshire Street, Boston, room 1057.

Machinery Markets and News of the Works

LARGE CANADIAN LIST

National Railways Issue Inquiry for Upward of 80 Items

Business Shows Steadily Advancing Tendency with Buying from More Scattered Sources

In keeping with the steady improvement in machine-tool business in the United States, the demand for tools in Canada is also on the upgrade. The Canadian National Railways have issued an inquiry for upward of 80 items for rehabilitation of its various repair shops and inquiry from other sources across the border is fairly substantial.

The position of machine-tool builders has improved to such an extent that some of them who did not accumulate stock during the dull times are now quoting six to ten weeks' delivery, whereas until recently nearly all companies were able to promise immediate shipment.

There has been good buying during the past week. The Baldwin Locomotive Works, Philadelphia, has bought 10 large machines and is in the market for about \$250,000 worth of additional equipment. The Gary Tube Co., Gary, Ind., has added to its recent purchases; the Herring-Hall-Marvin Safe Co., Ham-

ilton, Ohio, has bought a 16-ft. boring mill; the Hyatt Roller Bearing Co., Harrison, N. J., is buying on a liberal scale to replace machines recently discarded; the American Steel & Wire Co. has bought tools for its Cleveland plant; the Galion Iron Works & Mfg. Co., Galion, Ohio, is buying considerable equipment for the manufacture of road rollers; the Elgin National Watch Co., Elgin, Ill., has bought seven tools.

Among pending inquiries are the following: The St. Louis Southwestern Railroad has come into the market for 11 miscellaneous machines; the Hudson & Manhattan Railroad, New York, is about to close on a list; the Louisville & Nashville Railroad is expected to close shortly on a list recently sent out; the Timken Roller Bearing Co., Canton, Ohio, which has recently made purchases, is expected to close soon for 20 to 30 grinding machines; the Willys-Overland Co., Toledo, Ohio, is figuring on considerable equipment; the Alpha Portland Cement Co., Chicago, is asking prices on a half dozen used tools; the Lafayette Motors Co., Chicago, is expected to issue a small list soon. The Chicago, Rock Island & Pacific is in the market for three pipe machines and the Santa Fe for one pipe bending machine. Lists are expected at Chicago from practically all of the large roads, including the Santa Fe, the Illinois Central, the Chicago & Northwestern, the Burlington and the Rock Island.

New York

NEW YORK, Feb. 27.

THERE has been fairly good buying of machine tools during the week with heavy tools conspicuous. The Baldwin Locomotive Works, Philadelphia, placed an order for several large machines, including two rod millers, three 60-in. planers, two 84-in. planers, one 62-in. boring mill and two slotters. This company is in the market for an additional \$250,000 worth of equipment, most of it special for locomotive work. An Eastern machine tool company received orders from the Gary Tube Co., Gary, Ind., a new subsidiary of the United States Steel Corporation, for two lathes, one 30 in. x 30 ft., and the other 60 in. x 42 ft., and from the Herring-Hall-Marvin Safe Co., Hamilton, Ohio, for a 16-ft. boring mill. The Hyatt Rolling Bearing Co., Harrison, N. J., has bought considerable new shop equipment to replace machines recently discarded. Some machine tool plants which did not accumulate any surplus stock during the dull period of 1921 are now behind in deliveries. In a few instances shipments of certain tools cannot be promised in less than eight or ten weeks.

While the crane market in this district is active, demand is evidently not as great as in other territories. There are few inquiries for hand power cranes, but business in chain blocks is reported good and demand for electric hoists of small capacities is large. Sales of locomotive cranes show a gradual improvement. In electric overhead traveling cranes there is a new inquiry in the market from the Phoenix Utility Co., 71 Broadway, New York, for a 60-ton, 80-ft. span, 4-motor, overhead traveling crane with 10-ton auxiliary for installation at Houston, Tex. The Pennsylvania Railroad,

Eastern Region, Philadelphia, has revised an old inquiry for a bucket handling crane, increasing the capacity of the bucket to 2 cu. yd. and the span to about 46 ft.

Among recent purchases are:

Angelo Paine, 32 Court Street, Brooklyn, N. Y., a 10-ton, crawl-tread crane and trench hoe, for use on aqueduct for the city of New York, from the Northwest Engineering Co.;

Mulroy, Cook Co., Newark, N. J., a 25-ton locomotive crane from the Browning Co.;

Crampton Brothers, Great Neck, N. Y., a 20-ton used Browning locomotive crane from the Hoisting Machinery Co., 50 Church Street, New York;

Atlantic City Electric Co., Atlantic City, N. J., a 15-ton locomotive crane from the Browning Co.;

Louisville & Nashville Railroad, Louisville, Ky., a 20-ton locomotive crane from the Browning Co.;

Edgemoor Iron Co., Edgemoor, Del., one 15-ton and two 10-ton, 36-ft. 4-in. span, electric traveling cranes from the Niles-Bement-Pond Co.;

South American Gold & Platinum Co., 61 Broadway, New York, a 35-ton electric traveling crane for export to South America from the Niles-Bement-Pond Co.;

Ulster Iron Works, Dover, N. J., a 5-ton electric traveling crane from the Shepard Electric Crane & Hoist Co.;

Lancaster Iron Works, Lancaster, Pa., a 10-ton overhead traveling crane from Alfred Box & Co.;

Hunkins, Willis Lime & Cement Co., St. Louis, a 7-ton, 40-ft. boom crawl tread locomotive crane from the Orton & Steinbrenner Co.;

Bonney-Floyd Co., Columbus, Ohio, a 3-ton electric traveling crane for a steel foundry, from the Valls Engineering Co., Columbus, Ohio;

Buckeye Casting Co., Lima, Ohio, a 3-ton electric traveling crane for a steel foundry, from the Valls Engineering Co., Columbus;

American Steel & Wire Co., Consolidated works, Cleveland, a 10-ton electric traveling crane for steel mill, from the Valls Engineering Co., Columbus;

Ajax Iron Works, Corry, Pa., a 5-ton, 3-motor, overhead traveling crane from the Northern Engineering Works;

Vincennes Bridge Co., Vincennes, Ind., a 5-ton trolley for electric traveling crane from the Northern Engineering Works;

W. E. S. Dyer, Philadelphia, consulting engineer, ten 1½-ton, 33-ft. 10-in. span, 3-motor, floor control, overhead traveling cranes for a chemical plant in eastern Pennsylvania from the Northern Engineering Works. This sale was consummated several weeks ago, but the name of the purchaser was withheld.

The Ingram-Richardson Mfg. Co., 227 Fulton Street, New York, manufacturer of enameled iron signs, etc., with main plant at Beaver Falls, Pa., has awarded a contract to James Mitchell, Inc., 999 Bergen Avenue, Jersey City, N. J., for a one-story branch plant at Bayonne, N. J., 180 x 325 ft.

The Consolidated Products Co., 15 Park Row, New York, has inquiries out for grinding machinery, mechanical dryers, filter presses, disintegrators, evaporators and other equipment to be installed in a chemical plant.

The Queens Borough Gas & Electric Co., 347 Central Avenue, Far Rockaway, L. I., has acquired 30 acres on Sheridan Boulevard and Jamaica Bay, Inwood, L. I., as a site for a new plant to cost \$200,000. Carlton Macy is president.

The Mine & Smelter Supply Co., 42 Broadway, New York, is inquiring for two hydraulic wheel presses, 100 and 150 tons respectively.

Officials of the Air Reduction Corporation, 342 Madison Avenue, New York, and F. W. Braun of the Braun Corporation, New High Street, Los Angeles, have formed the California Cyanide Co., to build a plant at Los Angeles for the production of sodium cyanide and kindred products, estimated to cost \$500,000, with machinery. Plans call for a power house and machine shop.

E. C. Sherwood, 50 Church Street, New York, railroad contractors' equipment, has inquiries out for a stiff leg derrick, rigged for three lines, with boom from 70 to 80 ft.

A three-story machine, repair and service building 100 x 100 ft., to cost \$90,000, will be erected on West 153rd Street, New York, by Edds Garage, Inc., 1109 East Twenty-first Street, Brooklyn. Louis A. Sheinart, 194 Bowery, New York, is architect.

The Todd Shipyards Corporation, 25 Broadway, New York, will build a new drydock with machine and repair works at its Brooklyn plant, with capacity for accommodating vessels from 40,000 to 50,000 tons. It will cost \$500,000. William H. Todd is president.

The Savage Arms Corporation, 50 Church Street, New York, is making inquiries for a No. 14 Bliss toggle press.

Adolph Hirsh & Son, 56 John Street, New York, fertilizer products, are inquiring for two sets of mechanical roll dryers.

Motors, conveyors and other equipment will be installed in the new plant to be erected at Clinton and Lorraine Streets, Brooklyn, by Gerstendorfer Brothers, 231 East Forty-second Street, New York, for the manufacture of bronze powders, etc., estimated to cost \$385,000, for which a general contract has been let to the John W. Ferguson Co., Paterson, N. J. It will consist of a main seven-story building, with three one-story adjoining structures. Russell G. Cory, 30 Church Street, New York, is architect.

The Franklin Motor Car Co., 1826 Broadway, New York, manufacturer of automobiles with main works at Syracuse, N. Y., has purchased the former plant of the Browning Gun Co., College Point, L. I., to be used by a subsidiary organization for the production of automotive products.

The Superintendent of Lighthouses, Staten Island, N. Y., will take bids until Mar. 29 for 450 seamless drawn steel acetylene cylinders, as per specifications on file.

The Reliance Fireproof Door Co., Brooklyn, has removed its plant from 78 West Street, Greenpoint section, to a new building at 71-103 Dobbins Street, where increased space will be given over to bronze, copper and kalamein iron-covered doors and sash. Two new departments will be established for the production of steel door frames and bronze windows and store fronts. The factory approximates 45,000 sq. ft.

The Commonwealth Water Co., Summit, N. J., has been ordered by the State Board of Public Utility Commissioners to install new pumping machinery, compressors and other equipment at its plant, to be completed not later than Apr. 1.

The Standard Oil Co. of New Jersey, 26 Broadway, New York, will build a new power house at its refinery at Bayonne, N. J.

Fire, Feb. 20, destroyed a portion of the plant of the Bloomsbury Graphite Co., Bloomsbury, N. J., manufacturer of foundry facings, graphite products, etc., with loss esti-

mated at \$40,000, including equipment. It is planned to rebuild.

Fire, Feb. 16, destroyed a portion of the auxiliary operating buildings at the plant of the Warren Foundry & Machine Co., Phillipsburg, N. J., with loss reported at \$17,000. The structures will be rebuilt.

The Stern Mfg. Co., 72 Tichenor Street, Newark, N. J., manufacturing jewelers, is in the market for a speed lathe, medium sized, with all equipment.

Glander & Co., Inc., 800 Broad Street, Newark, machinery, have inquiries out for three high pressure pumps; also for a 6-ft. vacuum crystallizing pan.

The Art Craft Fixture Co., 85 Academy Street, Newark, manufacturer of lighting fixtures, has acquired a factory at Adams, Malvern and Delancey Streets for a new plant. The present works will be removed to this location and additional machinery installed.

The Tillinghast Rubber Mfg. Co., Stockton, N. J., manufacturer of rubber goods, is planning to rebuild the portion of its plant destroyed by fire Feb. 16, with loss estimated at \$100,000 including machinery. William J. McLaughlin is secretary.

New England

BOSTON, Feb. 26.

IMPROVEMENT in the volume of machine tools sold in this territory was noted the past week, but the business was confined to a few houses. One local house sold tools in every New England State except Maine, the aggregate value running into five figures. New and used tools were involved, ranging from hack saws to large presses and turret lathes. The largest sale by this house was to a New Britain, Conn., manufacturer and consisted of eight tools. A Massachusetts lighting company bought three tools, including one large turret lathe. Other houses report much smaller transactions, among them being a 28-in. drill and a motor-driven grinder taken by the Bangor & Aroostook Railroad, and a large shear by the Otis Elevator Co. A Boston dealer is about to close on a 62-in. milling machine and a large drill, and several other prospects show sufficient life to suggest sales in the immediate future, including large planing machines, lathes, milling machines and drills. Some crane business also gives indication of closing shortly.

The toe talk manufacturing units of the Aetna Nut Co., Southington, Conn. recently were destroyed by fire at an estimated loss of \$30,000.

A large unit, including machinery, at the Naval Torpedo Station, Newport, R. I., last week was damaged by fire to the extent of \$100,000.

The Weir Stove Co., Taunton, Mass., has awarded a contract to M. Witherell Sons, Taunton, for a four-story addition, 75 x 115 ft. Robert M. Leach is treasurer.

A manual training department will be installed in the new high school to be erected at Dalton, Mass., estimated to cost \$100,000. F. G. Crane, Jr., Board of Education, is in charge.

The Chase Companies, Waterbury, Conn., operating a brass tubing and metal works, have had plans prepared for a one-story addition, 65 x 67 ft. T. B. Peck, Waterbury, is architect.

A vocational department will be installed in the new West Side junior high school, three-stories, to be erected at Pawtucket, R. I., estimated to cost more than \$150,000. Robert C. N. Monahan, Pawtucket, architect, will soon call for bids on a general contract.

The General Fire Extinguisher Co., Providence, R. I., a subsidiary of the Grinnell Co., has awarded a contract to Heller Brothers, Thurman Street, Warren, Ohio, for a four-story addition to its Warren works, 80 x 200 ft., to cost about \$300,000 including machinery.

A manual training department will be installed in the new high school to be erected at Brewer, Me., to cost \$100,000. H. R. Houston is superintendent of schools, in charge.

The Manufacturers' Machine Tool & Supply Co., 256-60 Middle Street, Bridgeport, Conn., has inquiries out for presses, clamping machine and other equipment.

The Standard Electric Time Co., 90 Logan Street, Springfield, Mass., has awarded a contract to W. W. Davis, Bellevue Avenue, for the erection of three new units, three-story, 50 x 90 ft., and two one-story buildings adjoining, to cost about \$80,000.

The Board of Education, Medford, Mass., is arranging a list of equipment for installation in the manual training

department of the high school, to include two lathes, cylinder surface planer, woodworking machines, and other equipment.

The Kenney Brothers-Walters Co., Baldwinsville, Mass., manufacturer of furniture, is planning to rebuild the portion of its plant destroyed by fire Feb. 8, with loss estimated at \$75,000, including equipment.

The Bangor & Aroostock Railway Co., Bangor, Me., will commence the construction of additions to its car and locomotive repair shops at Houlton, Me., including the remodeling of present buildings. Moses Burpee, Houlton, is chief engineer.

A manual training department will be installed in the high school to be erected at Oakland, Me., estimated to cost \$90,000. Horace T. Muzzy, 173 Main Street, Waterville, Me., is architect.

The Gloucester Electric Co., Gloucester, Mass., will build a one-story addition to its power plant, to include generator, engine and auxiliary equipment. Charles T. Main, 49 Federal Street, Boston, is engineer.

A one-story power house will be constructed by the East Braintree Bleachers, Inc., East Braintree, Mass., in connection with additions estimated to cost \$40,000. Henry McCluster heads the company.

E. L. Dodge, 8 Friend Street, Boston, operating a furnace repair works, is planning for the installation of a punch press and other equipment.

The Vermont Hydro-Electric Corporation, Springfield, Vt., will install a new water wheel and auxiliary machinery at its hydro-electric power plant at Carvers' Falls. Improvements will also be made in the system in the vicinity of Hydeville, Vt.

The Boston Elevated Railway Co., 108 Massachusetts Avenue, Boston, will receive bids until March 5 for surface condensing equipment for installation in its power plant at South Boston.

Philadelphia

PHILADELPHIA, Feb. 26.

EXTENSIONS will be made by the Baldwin Locomotive Works, 500 North Broad Street, Philadelphia, in its plant at Eighteenth and Hamilton Streets, used for the construction of engine tenders, estimated to cost \$40,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until March 13 for 25,000 ft. of single conductor high tension ignition cable for the Philadelphia Navy Yard, schedule 553.

The Aluminum Sales Co., Inc., 2454 North Front Street, Philadelphia, has leased the five-story and basement building at 117-19 North Tenth Street for new works and executive headquarters.

The A. G. Hustedt Co., 1336 Spruce Street, Philadelphia, is inquiring for a small steam shovel, traction type.

The Parker-Schirey Co., Philadelphia, has leased a floor in the building at 500-2 Ludlow Street, for the manufacture of mechanical and other toys.

The Frankford Machine Co., 4099 Frankford Avenue, Philadelphia, has inquiries out for a screw machine.

A manual training department will be installed in the three-story and basement addition to be erected at the West Philadelphia Boys' Catholic High School, Forty-ninth and Chestnut Streets, estimated to cost \$500,000. The Hoffman Henon Co., Finance Building, Philadelphia, are architects.

The West Philadelphia Buick Co., Fifty-second and Chestnut Streets, Philadelphia, is making inquiries for a screw-cutting lathe.

Fire, Feb. 19, destroyed a portion of the plant of Maxwell, Rowland & Co., Welsh Road, Holmesburg, Philadelphia, manufacturers of shovels, with loss estimated at \$125,000. It is planned to rebuild.

The Foreign Trade Bureau, Philadelphia Commercial Museum, Thirty-fourth Street, has received an inquiry from a company at Lyons, France, for American paper-making machinery.

The E. H. Freeman Electric Co., Meade and Prince Streets, Trenton, N. J., is arranging for the installation of equipment and operation of its three-story addition, 35 x 164 ft., now being completed, for the manufacture of electric equipment.

The Pocono Foundry Co., Bath, Pa., is considering plans for extensions and the installation of additional equipment.

The Long Box Co., York, Pa., has been organized to take over and operate the factory of Marion H. Long, Newberry and Princess Street. Plans are under way for the installation of considerable new machinery. Harry W. Stauffer, manager at the local plant of the United States Chain & Forging Co., is an official of the new company and will be in charge of operations.

A manual training department will be installed in the

two-story and basement high school to be erected at Bedford, Pa., estimated to cost \$80,000. Hersh & Sholler, Altoona, Pa., are architects.

The Atlas Automobile Tire Co., Bethlehem, Pa., is planning for enlargements, including the installation of additional machinery.

A mechanical dryer and other equipment will be installed at the coal briquette manufacturing plant of the Lehigh Coal & Navigation Co., Lansford, Pa.

The Eastern Steel Products Co., Spring City, Pa., is planning for immediate operations at the plant of the Pennsylvania Shafting Co., recently acquired from the receiver. Improvements will be made and additional equipment installed. John Wilson is president.

Electrically operated pumping machinery will be installed by the Borough Council, Doylestown, Pa., at the municipal sewer and water plants, in connection with improvements to cost \$40,000.

A manual training department will be installed in the two and three-story high and grade school to be erected at Troy, Pa., estimated to cost \$150,000. Lawrie, Green & Co., 222 Market Street, Harrisburg, Pa., are architects.

The Montgomery Foundry & Fittings Co., Conshohocken, Pa., is completing plans for new works, 125 x 295 ft., at Washington and Cherry Streets. Construction will begin in April.

The Allentown Paper Box Co., Tenth and Green Streets, Allentown, Pa., has awarded contract to the Ritter & Smith Co., Allentown, for a three-story plant, 80 x 110 ft., at Jefferson and Liberty Streets, estimated to cost \$60,000. A list of machinery will soon be prepared. R. H. M. Rhoda heads the company.

The United States Axle Co., Pottstown, Pa., manufacturer of automobile axles and automotive parts, is planning for extensions and additional machinery. A fund of \$200,000 is being arranged for the expansion.

The Jeddo Highland Coal Co., Hazleton, Pa., is planning the construction of a one-story power house at its No. 2 Highland Colliery, to replace the one recently destroyed by fire.

A manual training department will be installed in the new two-story high school to be erected at Brommall, Pa., estimated to cost \$150,000. Henry L. Reinhold, Jr., 1513 Walnut Street, Philadelphia, is architect.

The Pennsylvania Electric Steel Co., Hamburg, Pa., has acquired the plant of the Driscoll-Rees Steel Co., idle for some time past, and plans for immediate operations for the production of tool steel products under a special process. Improvements will be made.

Pittsburgh

PITTSBURGH, Feb. 26.

THE Pittsburgh Wire Rope Co., Verona, Pittsburgh, has tentative plans for a one-story and basement factory, 120 x 150 ft., estimated to cost \$100,000, to replace a structure lately destroyed by fire. H. L. Williams is in charge.

The Federal Aluminum Co., Franklin, Pa., has acquired the former plant of the Colburn Machine Tool Co., abandoned when the company removed to Cleveland. The new owner will remodel the plant and install machinery for early operations.

A one-story power house and machine shop will be erected at 129 Fortieth Street, Pittsburgh, by the Fort Duquesne Laundry Co., for which a building permit has been issued.

The plant and property of the American Plate Glass Co., James City, near Kane, Pa., has been acquired by W. C. Durant, head of the Durant Motors, Inc., 1819 Broadway, New York, for \$5,000,000, to be operated as a subsidiary for glass production for Durant automobiles.

A manual training department will be installed in the new Douglas senior and junior high school to be erected at Huntingdon, Pa., estimated to cost \$125,000. W. H. Diehl, R. & P. Building, is architect.

The Virginian Power Co., Charleston, W. Va., has plans for the construction of a hydroelectric power plant on the New River, near Hinton, W. Va., to cost \$300,000.

The Guyan Machine Shops, Logan, W. Va., are inquiring for a motor-generator set of 100 to 150 kw. capacity, or rotary converter of like size. Also for a cylinder grinder for automobile engines and electric hoist.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, is completing negotiations for the purchase of the former plant of the Wilson-Snyder Mfg. Co., Ross and Water Streets, Pittsburgh, manufacturer of pumping machinery, etc., now located at Braddock, Pa. The structure totals 40,000 sq. ft. It will either be demolished and a new building erected, or remodeled and equipped for repair and parts department for

Westinghouse machinery. The work is estimated to cost close to \$500,000.

Fire, Feb. 18, destroyed a portion of the plant of the Pennsylvania Paper Stock Co., 516-26 First Avenue, Pittsburgh, with loss approximating \$75,000, including equipment. It is planned to rebuild.

The Lakeside Refining Co., Franklin, Pa., recently organized, has taken over the refinery of the Foco Oil Co., and plans to place it in operation at an early date. Improvements will be made in the equipment.

The Pine Creek Pocahontas Co., Humoco, W. Va., recently organized by the same interests previously connected with the Pine Creek Coal Co., lately sold to the Ford Motor Co., is planning for the installation of works on 2500 acres of coal lands in McDowell County, with tipple and equipment for a capacity of 350 tons per day. A power house and machine shop will be built. T. B. Davis is president, and J. D. Francis, vice-president.

The United States Engineer Office, Huntington, W. Va., will receive bids until March 5 for a quantity of steam specialties, including brass globe, angle and check valves, unions, bushings, pipe couplings, etc., as set forth in circular 78.

An electrically operated pumping plant will be installed in the proposed sewerage disposal plant to be constructed by the City Council, Grove City, Pa., estimated to cost \$50,000.

The Consolidated Power & Light Co., Clarksburg, W. Va., recently organized with a capital of \$5,000,000, will take over and operate the Consolidated Light, Heat & Power Co., Huntington, W. Va. Plans are projected for extensions in the present generating plants and system.

Baltimore

BALTIMORE, Feb. 26.

THE Maryland Toy Mfg. Co., Baltimore, has acquired the former plant of the International Wood Products Co., bounded by Lexington and Vine Streets and Calverton Road for \$50,000. It will be remodeled and equipped for the manufacture of mechanical and other toys.

The American Brick Corporation, Suffolk, Va., will commence the immediate erection of a new plant estimated to cost \$35,000. R. L. Jacobs is president, and Lewis G. Brothers, secretary.

The Purchasing Agent, Post Office Department, Washington, will take bids until March 5, for a quantity of 28-in. wide conveyor belting for use on the parcel post conveyor at the Charleston, S. C., post office.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until March 20, for refrigerating machinery for Eastern and Western navy yards, schedule 540.

The Instant Collapsible Rim Corporation, Bank of Commerce Building, Norfolk, Va., James L. Bell, president, is planning the establishment of a factory at Suffolk, Va., for the manufacture of metal rims for automobiles, estimated to cost \$90,000. The company was organized recently with a capital of \$75,000.

G. A. Davidson, 1825 F Street, N.W., Washington, is inquiring for machinery to manufacture concrete blocks and kindred products.

The Speakman Co., 816 Tatnall Street, Wilmington, Del., manufacturer of steam supplies, plumbing equipment, etc., is completing an extension 60 x 80 ft., and will install additional equipment. Brown & Whiteside, Inc., duPont Building, are architects.

A manual training department will be installed in the new high school to be erected at Olanta, S. C., estimated to cost \$90,000. W. D. Harper, Florence, S. C., architect, is taking bids on a general contract.

The Georgia Railway & Power Co., Atlanta, Ga., has purchased a site on Walton Street for a new power house.

Motors, ovens and other equipment will be installed in the two-story plant, 100 x 150 ft., to be erected by the Carolina Baking Co., 602 South Church Street, Charlotte, N. C., estimated to cost \$150,000. The McCormick Co., 41 Park Row, New York, is architect.

Adolph Segal, care of Charles B. Hughes, president Hughes-Ellis-Howell Corporation, 403 Boush Street, Norfolk, Va., is perfecting plans for the organization of a company to build and operate a sugar refinery on local site. The initial works will include a power house, machine shop and other mechanical buildings, equipped for a capacity of 3000 bbl. per day. It is estimated to cost \$3,500,000, with machinery. Mr. Hughes is also interested in the project.

Traveling cranes, conveyors and other coal-handling machinery will be installed on the new coal pier to be erected by the Chesapeake & Ohio Railroad, Norfolk, Va., at Newport News, Va., estimated to cost \$3,000,000. A grain elevator

will also be constructed, to include mechanical dryers, car dumpers, conveyors and cleaning machinery, estimated to cost \$1,000,000.

R. P. Johnson, Wytheville, Va., machinery dealer, is in the market for a 40-hp. marine type boiler, and 25-hp. locomotive type boiler and auxiliary equipment.

The Carolina Power & Light Co., Raleigh, N. C., has plans for enlargements in its power houses at Selma and Goldsboro, N. C., including the installation of additional equipment.

The American Ice Co., Calvert Building, Baltimore, will commence the erection of a one-story plant at 623-35 North Eden Street, 57 x 98 ft., estimated to cost \$100,000, with machinery. C. Leslie Weir, architect and engineer for the Knickerbocker Ice Co., 45 East Forty-second Street, New York, has prepared plans.

The McCall's Ferry Power Co., Elkton, Md., has purchased the plant and property of the Gilpin Falls Electric Light Co. from the receivers for \$75,000. Plans are under way for extensions and improvements, including the installation of additional equipment.

A manual training department will be installed in the new senior high school to be erected at Roanoke, Va., estimated to cost \$175,000, for which bids are being asked on a general contract until March 15. H. Courcy Richards, 808 Chestnut Street, Philadelphia, is architect.

The Standard Electric Machinery Co., 7 East Hill Street, Baltimore, machinery dealer, has inquiries out for a 37½ to 50 kva. field alternator, with exciter, switchboard and auxiliary equipment.

The Bartlett Hayward Co., Scott and McHenry Streets, Baltimore, manufacturer of machinery, gas plant equipment, etc., has filed plans for a one-story addition, 40 x 85 ft.

A one-story power plant will be constructed by the Wilkes Hosiery Co., F Street, North Wilkesboro, N. C., in connection with a new mill, estimated to cost \$100,000. P. Ward Eshelman is president.

The Interstate Co-Operative Co., Belhaven, N. C., is planning to rebuild the portion of its wood-working plant and lumber mill, destroyed by fire Feb. 18, with loss estimated at \$50,000, including equipment.

The Baltimore Gas Appliance & Mfg. Co., Bayard Street, Baltimore, will commence the erection of three new one-story units, 45 x 195 ft., 25 x 63 ft., and 25 x 65 ft., estimated to cost \$50,000.

The Mallory Machinery Corporation, 522 Light Street, Baltimore, machinery dealer, is making inquiries for a 35 to 40-hp. motor, with extended shafts.

Electrically operated pumping machinery will be installed in the new municipal filtration and waterworks plant to be constructed by the Common Council, Charlotte, N. C., for which a bond issue of \$300,000 will be available.

The Central Railway of Georgia, Savannah, Ga., is considering the construction of a new cold storage and refrigerating plant at Macon, Ga., to cost \$200,000, including machinery.

The Wilson-Hock Co., City Point, Va., machinery dealer, is in the market for a 75-kw., belt-driven generator, with auxiliary equipment; also, for one belt-driven air compressor, 300 to 400 cu. ft. capacity, and for 3 and 5-kw. transformers, and auxiliary equipment.

The Williams-Brownell Lumber Co., Biltmore, N. C., is planning to rebuild the portion of its mill, recently destroyed by fire, with loss estimated at \$90,000, including machinery.

Buffalo

BUFFALO, Feb. 26.

THE New Process Gear Co., Plum Street, Syracuse, N. Y., a subsidiary of the Durant Motors, Inc., 1819 Broadway, New York, will commence the erection of a one-story addition to cost \$40,000. Mills, Rhines, Bellman & Nordhoff, Ohio Building, Toledo, Ohio, are architects.

The Niagara, Lockport & Ontario Power Co., Niagara Falls, N. Y., has applied for permission to acquire the plant and property of the Lower Niagara River Power & Water Supply Co. and will make extensions and improvements, including additional machinery installation.

Tordoff & Sons, 12 Harrison Street, Jamestown, N. Y., manufacturers of heating equipment, etc., are planning the erection of a new factory.

The Clark Brothers Co., Lincoln Street, Olean, N. Y., manufacturer of sawmill machinery, engines, etc., is planning for the installation of a boring machine.

The Oswegatchie Paper Co., Gouverneur, N. Y., is planning for the installation of a new engine, boiler and auxiliary equipment at its power house.

The Niagara Blower Co., Howard Street, Buffalo, manu-

facturer of ventilating equipment, etc., has filed plans for a one-story building, 60 x 180 ft., at 673 Ontario Street, to cost approximately \$25,000.

The Commissioner of Public Works, Municipal Building, Buffalo, will receive bids until March 12, for pipe castings for the municipal water filtration plant. George C. Andrews is engineer, Filtration Division.

The Watertown Stone Products, Inc., Water Street, Watertown, N. Y., is planning for the installation of a rock crusher and auxiliary machinery.

A three-story and basement mechanical and engineering building, 60 x 180 ft., will be built by the Canisius College, Buffalo. Bley & Lyman, 250 Delaware Avenue, are architects.

The G. J. Davis Co., Adams Center, N. Y., operating a machine shop and sheet metal works, will install a pipe-threading machine and other equipment.

Fire, Feb. 18, destroyed the power house and other buildings at the plant of the Beakes Dairy Co., Massena, N. Y., with loss approximating \$100,000, including machinery.

W. H. Sells, 523 Cornwall Avenue, Buffalo, will install equipment in a local building for the manufacture of canning machinery and parts.

The Board of Directors, Union Academy, Belleville, N. Y., has authorized the purchase of tool and equipment for a vocational department. W. K. Mott, Woolworth Building, Watertown, N. Y., is in charge.

The F. J. Francis Co., Inc., Ogdensburg, N. Y., operating an electrical construction works, is planning for the installation of an annealing furnace.

A manual training department will be installed in the two-story and basement senior and junior high school, 150 x 150 ft., to be erected at Owego, N. Y., estimated to cost \$270,000, for which bids are being taken on a general contract. Coffin & Coffin, 522 Fifth Avenue, New York, are architects.

Detroit

DETROIT, Feb. 26.

THE Ross Carrier Co., Miller and Second Streets, Detroit, manufacturer of conveying equipment, etc., is considering the erection of a one-story addition, 50 x 100 ft., estimated to cost \$25,000. H. B. Ross is president.

The Kelsey Wheel Co., 3600 Military Avenue, Detroit, has filed plans for a one-story addition to cost \$25,000.

Fire, Feb. 19, destroyed a portion of the plant of the Brunswick-Balke-Collender Co., Muskegon, Mich., manufacturer of talking machines, billiard tables, etc., with loss estimated at \$200,000, including machinery. It is planned to rebuild. Headquarters of the company are at 629 South Wabash Avenue, Chicago.

The Holland Maid Co., Holland, Mich., has been organized with a capital of \$400,000 to take over the plant of the Holland Mfg. Co., manufacturer of electric washing machines and parts. Extensions and improvements are contemplated.

The Pere Marquette Railroad Co., Detroit, is arranging an improvement program to cost about \$10,000,000. The work will include the construction of a new engine terminal and shop at Twelfth Street, Detroit, with machine, iron-working, parts, engine truck and other buildings, estimated to cost \$1,200,000. Similar extensions and improvements will be made at the Wyoming yards, Grand Rapids, Mich., to cost approximately \$1,500,000, with equipment. A new electric block system is planned between Alexis and Carleton, to cost \$100,000. New steel water tanks will be installed at different points on the lines to cost \$75,000.

Plans are being completed for the new vocational school, including mechanical shops and laboratories, to be erected at Flint, Mich., estimated to cost \$80,000, and bids on a general contract will be called at an early date. Ralcomson, Higginbotham & Palmer, Moffat Building, Detroit, are architects.

A manual training department will be installed in the new two-story high school, 80 x 135 ft., to be erected at South Haven, Mich., estimated to cost \$100,000. The Board of Education is in charge.

The Water Commission, Bay City, Mich., will receive bids until March 5, for electrical and mechanical equipment to be installed at the municipal waterworks, estimated to cost \$150,000. In addition to this contract, the commission is in the market for two or more low-lift centrifugal pumps, with total capacity of 15,000,000 gal. Frazier, Sheal & Ellms, B. F. Keith Building, Cleveland, are engineers.

The Clayton-Lambert Mfg. Co., Knodell Avenue, Detroit, is planning for the installation of machine tools and other equipment at its works.

Frank S. Bicking, West Chester, Pa., formerly connected with the S. Austin Bicking Paper Co., East Downington, Pa., has acquired the plant of the Mullen Brothers Paper Co.,

St. Joseph, Mich., recently in receivership, for \$100,000. The new owner will organize a company to take over and operate the mill. Extensions and improvements are planned, including additional equipment installation.

Officials of the Clark Equipment Co., Buchanan, Mich., manufacturer of factory trucks, etc., have organized the Clark-Celfor Tool Corporation, with capital of \$50,000, as a subsidiary, to establish a plant for the manufacture of automotive tools.

Chicago

CHICAGO, Feb. 26.

MACHINE tool buying is showing a steady gain with orders coming largely from miscellaneous sources. Most purchases call for individual machines, although occasionally a group of tools is placed. The Elgin National Watch Co., Elgin, Ill., has ordered one 18-in., one 14-in., and three 16-in. engine lathes, a boring mill, and a 24-in. x 24-in. x 6-ft. planer. The Miehle Printing Press & Mfg. Co., Chicago, has purchased a 3-ft. radial drill and a 16-in. engine lathe. The General American Tank Car Corporation, Chicago, has closed for a large milling machine and a 120-in. plate shear to cut $\frac{3}{8}$ -in. stock. There has been little new business from the automotive industry, but the LaFayette Motors Co., Milwaukee, is expected to issue a small list to round out its present equipment. Notwithstanding the dearth of railroad buying this month, orders from other sources will probably bring sales totals of local dealers up to those of January, if not higher. The Chicago, Indianapolis & Louisville has purchased a car wheel boring machine. The Santa Fe has issued an inquiry for a pipe bending machine with capacity for $1\frac{1}{4}$ to $2\frac{1}{2}$ -in. pipe. The Rock Island is in the market for three pipe machines. Lists are now expected from practically all of the large local roads, including the Santa Fe, the Illinois Central, the Chicago & Northwestern, the Burlington, and the Rock Island.

The Alpha Portland Cement Co., Chicago, is inquiring for second-hand equipment as follows: One 16-in. heavy duty lathe with 10 or 12-ft. bed, one power hack saw to take an 18-in. blade, one 4-ft. radial drill, and one bolt cutter to cut $\frac{3}{8}$ -in. to 2-in. bolts, for its Ironton, Ohio, mill; and one 42-in. heavy duty lathe and one 5-ft. radial drill for its LaSalle, Ill., mill.

The South Side Elevated Railroad Co., Chicago, is inquiring for the following wood-working equipment: One motor-driven wood-boring machine having a capacity up to 2 in. in diameter, one 12-in. motor-driven jointing machine, and one 16-in. motor-driven jointing machine.

The Arnold Co., Chicago, has taken bids on a 200-ton electric traveling crane, two 15-ton electric cranes, and one 20-ton electric crane for the new Grand Rapids, Mich., shop of the Pere Marquette.

The R. B. Hayward Co., manufacturer of ventilating systems, 849 West Ohio Street, Chicago, has let contract for a one-story factory, 253 x 256 ft., at the northwest corner of Sheffield Avenue and Marcy Street, to cost \$50,000.

John Campbell, 2631 East Seventy-fourth Street, Chicago, is having plans prepared for a two-story factory, 50 x 160 ft., for the manufacture of automobile parts, at 2732-34 Indiana Avenue, to cost \$40,000.

Allen A. Mills, 53 West Jackson Boulevard, Chicago, has let contract for a one-story welding shop, 54 x 112 ft., at 2613-17 South State Street, to cost \$19,000.

The Am-Plus Storage Battery Co., formerly at 741 Van Buren Street, Chicago, has leased the third floor, 100 x 100 ft., of the building at 429 West Superior Street. It manufactures storage batteries.

The Standard Metal Screen & Weather Strip Co., previously at 139 North Clark Street, Chicago, has leased space, 50 x 100 ft., at 429 West Superior Street.

The Rosen Machine Co., a recently organized corporation which has taken over the business of the Joe Rosen Machine Works, 126 West Front Street, Davenport, Iowa, will build a plant on East Second Street to cost \$25,000. The company is engaged in the repair of automobile motors, especially cylinders and other parts having bearing surfaces, and general machine shop work.

The Waller Mfg. Co., Oelwein, Iowa, manufacturer of automobile heaters, muffler cut-outs, and general shop equipment, will remove its factory to a temporary location in East Dubuque, Iowa, pending the location of a suitable building in Dubuque.

The Kennedy Car Liner & Bag Co., Shelbyville, Ind., has placed a contract for the construction of a plant, 250 x 400 ft., to replace a building recently destroyed by fire.

Fire recently destroyed the plant of the Eagle Mfg. Co., manufacturer of farm implements, Morton, Ill., with a loss estimated at \$75,000.

The American Steel Foundries, Chicago, will dismantle its plant at East Chicago, Ind., known as No. 3 Forge Shop, a two-story structure, 85 x 450 ft., which was built during the war for the manufacture of munitions. Equipment and materials will be used for the enlargement of other plants of the company.

The Waldorf Paper Products Co., Hampden Street and Wabash Avenue, St. Paul, Minn., will take bids early in March for a new five-story plant, 85 x 250 ft., to cost \$250,000 including machinery. H. A. Sullwold, 641 Endicott Building, is architect and engineer. W. W. Woldong is president.

A manual training department will be installed in the two-story and basement addition to be erected at the high school, Maywood, Ill., estimated to cost \$250,000. J. A. Chiaro, 7 Broadway, Melrose Park, Ill., is architect.

The Continental Gas & Electric Corporation, Lincoln, Neb., is planning for extensions and improvements in the plant and system of the Lincoln Gas & Electric Co., recently acquired. Additional equipment will be installed.

The Albert Emanuel Co., Inc., 61 Broadway, New York, operating public utility properties, has acquired the plant and system of the Dubuque Electric Co., Dubuque, Iowa, and the Eastern Iowa Electric Co. The new owner plans for extensions in the power plants and transmission lines.

The Iowa Cold Storage Co., Gilmore, Iowa, is considering the erection of a new one-story ice manufacturing and cold storage plant, 70 x 100 ft., at Eagle Grove, Iowa, estimated to cost \$50,000. C. W. Lamphere is president.

The Osgood & Blodgett Mfg. Co., St. Paul, Minn., is considering plans for rebuilding the portion of its box-manufacturing plant at East Seventh Street and Duluth Avenue, destroyed by fire Feb. 12 with loss estimated at \$150,000, including machinery.

A manual training department will be installed in the new two-story high school to be erected at Spencer, S. D., to cost \$100,000. Hughill & Blatherwick, Boyce-Greeley Building, Sioux Fall, S. D., architects, will soon call for bids.

The Sioux City Brick & Tile Co., 9 West Third Street, Sioux City, Iowa, is planning to rebuild the portion of its plant recently destroyed by fire, with loss of \$50,000, including equipment.

Cleveland

CLEVELAND, Feb. 26.

MACHINE tool sales have fallen off slightly, but the volume of inquiry continues good. Used machinery appears to be a factor in the market. The Galion Iron Works & Mfg. Co., Galion, Ohio, is buying considerable machinery for equipping a plant for the manufacture of road rollers, the requirements including lathes, planers, radial drills and boring machines. It is reported to have already purchased considerable machinery and rebuilt and used tools. It also has an inquiry out for a 15-ton electric traveling crane. The Willys Overland Co., Toledo, is figuring on considerable equipment and the past week purchased a 42-in. open side planer. The Timken Roller Bearing Co., Canton, Ohio, which has been purchasing additional equipment, is reported to be in the market for 20 to 30 grinding machines.

The trade does not look for much round lot buying by the automobile industry within the next few months, but with keener competition among car builders and higher cost of material, it is claimed that the automobile industry is showing more interest than ever in equipment that will further reduce production costs, and a fair demand is expected from this source for production machines of more or less special types. Manufacturers of automatic machinery report a good volume of orders for one or two machines and some round lot business in automatic machines is pending.

Reports from foundry industry indicate that malleable foundries are now operating from 75 to 80 per cent of normal capacity and on as large a production basis as is possible with the present shortage of labor. During the past few weeks there has been a marked increase from the agricultural implement manufacturers for malleable castings and

there has also been some gain in demand from the railroads. The call from the automotive industry continues heavy.

The Cleveland Structural Steel Co. has acquired a site on East Seventy-sixth Street and the Wheeling & Lake Erie Railroad on which it will erect a one-story plant 88 x 108 ft., which will be occupied by the Mechanical Mfg. Co.

The General Motors Corporation has acquired the plant and the automobile body business of the Milburn Wagon Co., Toledo, Ohio consisting of a four-story building and 20 acres of land. The Milburn company will continue to manufacture electric automobiles in another Toledo plant which it is occupying.

The Galion Iron Works & Mfg. Co., Galion, Ohio, will erect a new factory, 115 x 400 ft., for the manufacture of road rollers which the company has been having built in other shops. It is stated that the new plant and equipment will involve an expenditure of \$300,000. A stock issue has been underwritten to provide the necessary funds.

The W. S. Tyler Co., Cleveland, manufacturer of wire screen and other wire products, will shortly begin the erection of a six-story reinforced concrete building, 119 x 221 ft.

The Shunk Mfg. Co., Bucyrus, Ohio, will engage in the manufacture of motor truck hoists and truck bodies. It will occupy the Allen Motor plant, in which some new equipment will be installed.

The Ohio Galvanizing Co., Niles, Ohio, has placed contract with the Warren Engineering Co. for an addition, 76 x 120 ft. It manufactures various products of galvanized sheets.

The Worldsey Co., formerly located in Morehead, has moved its plant to 5209 Prospect Avenue, S.E., Cleveland, where it will engage in the manufacture of motion picture projection machines. Edward L. Frantz is president; C. G. Frantz, vice-president; W. T. Holliday, secretary, and G. H. Levan, treasurer.

The Tiffin Art Metal Co., Tiffin, Ohio, has placed contract for the erection of a new factory which will increase its capacity approximately 100 per cent.

The Grimes Lock & Hardware Co., recently organized, has established a plant at 1782 East Thirty-seventh Street, Cleveland, for the manufacture of locks.

The Perfection Trailer & Mfg. Co., Cleveland, has had plans prepared for a factory to cost \$75,000.

Milwaukee

MILWAUKEE, Feb. 26.

WHILE large lot business in machine tools is absent, the aggregate sales of single tools or small lots is encouraging. Inquiry continues fairly active and it is regarded as significant that industries other than automotive lines are presenting prospective requirements for estimates. Locally, the call for tool room as well as floor equipment is moderate and indications are that considerable business will be placed from this time forward. Jobbing machine shops are steadily progressing to a capacity point, while manufacturers of metal products have reached the stage where existing capacity is insufficient. Conservatism is strongly apparent, however, in projecting additions, which at this time are being planned to serve actual rather than possible requirements.

A large list of miscellaneous equipment is being purchased by the Simmons Co., Kenosha, Wis., for quick delivery, for a new \$1,000,000 unit of its Kenosha works, to be used exclusively for the manufacture of steel furniture for hotels, hospitals, and offices. Heretofore the Simmons Co. manufactured steel beds only. Contracts have been let for a ten-story brick and steel factory, 160 x 260 ft., to be ready about April 15 for equipment.

The Milwaukee Electric Railway & Light Co., 217 Sycamore Street, Milwaukee, is placing contracts for equipment for an addition to the Lakeside steam generating plant at Packard Avenue and Lake Road, near Cudahy to cost about \$900,000 complete. Roy H. Pinkley is engineer in charge.

The Western Leather Co., 878 Marshall Street, Milwaukee, has engaged Cahill & Douglas, consulting engineers, 217 West Water Street, to design a power plant addition to provide 200-hp. additional steam generating capacity. Frank H. Fiedler is managing director.

The Lakeside Mfg. Co., Madison, Wis., has been incorporated with a capital stock of \$100,000 to manufacture tools, machinery and labor saving appliances and devices. The incorporators are A. T. Rose, R. L. Hopkins and Vromon Mason attorney, all of Madison. Negotiations are pending for the lease of a factory.

The Door County Fruit Growers' Union, Sturgeon Bay, Wis., has ordered plans and specifications for a \$50,000 cold storage building and pre-cooling plant to serve its fruit canning and preserving factory. Work will start April 1.

The Common Council, Manitowoc, Wis., has authorized the board of public works to call for estimates for the remodeling and enlargement of the municipal electric light and power plant, which will require the following equipment: One 2000-kw. turbine to replace the present 300-kw. unit; two 4000-hp. boilers; one 2000-hp. feed water heater, duplex pump, mechanical stokers, complete switchboard equipment and auxiliaries. The cost will run from \$75,000 to \$100,000. Definite decision to make the improvement will be made after estimates are received.

Benedict & Trenary, Platteville, Wis., contemplate the erection of a two-story cold storage plant with refrigerating system, 70 x 100 ft., and to cost about \$50,000 complete. Tentative plans are under consideration and it is expected that bids will be asked shortly after March 1.

Fred Hensel, proprietor Yellow Cab Co., Sheboygan, Wis., will build a two-story garage and service station, 60 x 100 ft., and has engaged Edward A. Juul, local architect, to make plans and let contracts.

The Hardware Specialty Co., Green Bay, Wis., has been organized with a capital of 500 shares of common stock without par value, by W. H. Cannard, J. H. Barrett, Joseph Jero-vitz and A. J. Heraly to manufacture hardware and metal specialties, automobile parts and equipment, metal building material, etc. Definite details of the plans have not yet been given out.

R. E. Newby, 201 Clark Street, Stevens Point, Wis., Buick dealer, will let contracts about March 1 for a new building, 70 x 124 ft., two stories and basement, to include a complete machine and repair shop for which a small list of equipment is now being purchased. The architect is J. E. Mayer.

The La Crosse, Wis., Board of Industrial Education expects to ask bids after March 10 for the new central vocational school, plans for which are being completed by Otto A. Merman, local architect. It will be 142 x 206 ft., two stories and basement, and is estimated to cost \$165,000 complete. J. B. Funke is president of the board.

The La Crosse Motors Equipment Co., capital stock \$50,000, has been incorporated at La Crosse, Wis., by J. Magio, W. E. Hickisch and F. R. Chopiesky to take over the business established by them recently for the manufacture of pistons, piston rings, pins and other gas engine parts. The equipment is being augmented considerably.

Cincinnati

CINCINNATI, Feb. 26.

INQUIRY for machine tools continues active and while no large purchases are reported single orders being booked reach fairly heavy proportions. Orders are coming from widely scattered points, although in the past week activity was more pronounced in the extreme East and South. Railroad business continues to come out and in addition to the list issued by the Norfolk & Western, the St. Louis Southwestern Railroad sent out an inquiry for 11 miscellaneous machines, including bushing presses, grinders, portable electric tools, and wood-working machinery. The Hudson & Manhattan Railroad will take action this week on its list issued some time ago. The American Steel & Wire Co. has bought tools for its Cleveland plant. The Louisville & Nashville Railroad is expected to close soon on its list issued some weeks ago.

The advancing costs of materials entering into the manufacture of tools is receiving close attention from manufacturers, and it is probable that price advances will be made within a few weeks. Some manufacturers of shapers will probably announce an advance effective March 1, but this is not expected to be general.

The laboratory of the American Rolling Mill Co., Ashland, Ky., was destroyed by fire Feb. 12, with a loss of \$10,000. It will be rebuilt.

The American Blower Co., Cincinnati, has awarded contract for a power house adjacent to its plant on Tennessee Avenue.

The Washington Gas & Electric Co., Washington Court-house, Ohio, is preparing plans for an extension to its plant, to include power generating equipment.

The Ohio Stove Co., Portsmouth, Ohio, has awarded contract to the Austin Co., Cleveland, for a foundry, 100 x 300 ft., and a cupola building, 40 x 40 ft., which is expected to

be ready for occupancy in about 90 days. The present foundry will be converted into an assembling plant.

The Vulcan Last Co., Portsmouth, Ohio, is contemplating the erection of an addition for the production of fibre form lasts. It recently increased its capitalization from \$450,000 to \$2,000,000 and has completed the rebuilding of its plant at Crandon, Wis., destroyed by fire several months ago.

The Duro Pump & Mfg. Co., Dayton, Ohio, is contemplating the erection of a five-story factory to cost \$225,000.

The Kilgore Mfg. Co., Westerville, Ohio, has purchased the foundry formerly owned by H. T. Hance, and is erecting an addition which will greatly increase its capacity. It manufactures toys and novelties. H. B. Watkins is general manager.

The Inland Mfg. Co., Dayton, Ohio, a Delaware corporation, has been organized as a subsidiary unit of the General Motors Corporation to manufacture automobile steering wheels and other accessories. It has taken over plant No. 3 of the Dayton-Wright Co. and it is understood that extensions are contemplated. H. E. Talbott, Jr., is president.

The Everwear Mfg. Co., Springfield, Ohio, has awarded contract to John Reeder for two additions, one to the office and the other to the main works. The latter is for a galvanizing department. H. E. Boggess, treasurer, reports that the space is needed to take care of the increased business.

Indiana

INDIANAPOLIS, Feb. 26.

THE National Hame & Chain Co., New Albany, Ind., has engaged Arthur Loomis, Louisville, to prepare plans for new works to replace that recently destroyed by fire. It is estimated to cost \$100,000. George D. Todd is president and general manager.

Dad's Factories, Indianapolis, manufacturers of automobile equipment and accessories, are planning for the early installation of machinery in their new reinforced-concrete addition now in course of erection, estimated to cost \$75,000. Homer A. Woods heads the company.

The Burnet-Binford Lumber Co., 1401 West Thirtieth Street, Indianapolis, will make extensions in its power house, including the installation of boilers and auxiliary equipment.

The Acme Tool & Machine Co., Indianapolis, recently organized to manufacture automobile equipment, has leased property at 1306 Brookside Avenue. C. F. Biles is one of the heads of the company.

The Gedge Brothers Roofing Co., Anderson, Ind., manufacturer of metal roofing, is planning the installation of new bending and forming machinery.

The Indianapolis Wire & Iron Works, Indianapolis, has leased property at 2230 Alvord Street, 100 x 150 ft., for a new plant. R. M. Howard is head.

The Pressel-Sanders Co., 1016 South Gale Street, Indianapolis, operating a planing mill and wood-working plant, is planning the installation of additional motor-driven machinery.

Carman & Fryer, Indianapolis, operating an electrical contracting business, have acquired the electrical repair department of the Vonnegut Machine Co., with local works, and will operate it in the future. The works will be extended and additional equipment installed.

E. Schmid & Co., Indianapolis, have leased property at 2810 South Meridian Street, and will establish a new plant to manufacture surgical instruments.

The Pacific Coast

SAN FRANCISCO, Feb. 20.

NISS BROTHERS, Covina, Cal., manufacturers of mechanical equipment, have plans for a new factory, 100 x 100 ft., to manufacture agricultural implements, and will break ground early in March. Other units will be built later.

The Richmond Sanitary Mfg. Co., Oakland, Cal., has awarded contract to Cahill Brothers, 110 Sutter Street, San Francisco, for a new two-story plant at Ninth and Alice Streets, to cost approximately \$25,000.

The E. K. Wood Lumber Co., Anacortes, Wash., is completing plans for a new mill at Burrows Bay, with daily cutting capacity of more than 1,000,000 ft. The works will include a machine shop and power plant and is estimated to cost \$400,000, including machinery.

The Doble Steam Cars Co., Call Building, San Francisco, manufacturer of steam-propelled automobiles, will commence the erection of the first unit of a new plant at Emeryville, Cal., where an entire block has been purchased. It will cost about \$100,000, including machinery.

A manual training department will be installed in the

new high school to be erected at Santa Monica, Cal., estimated to cost \$120,000. Allison & Allison, Hibernian Building, Los Angeles, are architects.

The Tucson Gas, Electric Light & Power Co., Tucson, Ariz., has plans for extensions and improvements in its electric generating plant and system, estimated to cost \$250,000. Samuel Headman is engineer in charge of construction.

The Coast Welding & Machine Shop, San Pedro, Los Angeles, has secured property near the yard of the Los Angeles Shipbuilding & Dry Dock Co., and plans the erection of machine works to cost \$45,000, including equipment.

The Wheeler-Osgood Co., Tacoma, Wash., manufacturer of sash, doors, etc., has awarded contract to S. C. Erickson, Tacoma, Wash., for a new plant, three-stories, 95 x 335 ft., on the tide flats, estimated to cost \$250,000, including machinery. It is purposed to have the mill ready for equipment late in April.

William Gilbert, Ada, Okla., has purchased a site at Pocatello, Idaho, for a new foundry for the production of large cast frames and gates for irrigation service. It will cost \$30,000.

The Central California Ice Co., Fresno, Cal., has acquired property on Sixth Street, Taft, Cal., for a new ice-manufacturing and refrigerating plant, with initial capacity of 50 tons a day. It is estimated to cost \$70,000, with machinery.

The Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, has acquired a 30-acre tract at Davis, Yolo County, as a site for a machine and repair shop, power station and other buildings, estimated to cost \$100,000 with equipment.

The Pacific Coast Borax Co., Kohl Building, San Francisco, will soon call for bids for the erection of a one-story machine shop and power plant at its new refinery at San Pedro, Los Angeles, estimated to cost \$100,000. The entire works will cost in excess of \$500,000, including machinery. Albert C. Martin, 430 Higgins Building, Los Angeles, is architect.

The Gulf States

BIRMINGHAM, Feb. 26.

J. D. HAZEN, Sarasota, Fla., has plans under way for a new machine shop and foundry at Hog Creek Basin, to be used primarily for marine repair work. The structures will each be 35 x 75 ft.

The Hughes Tool Co., Baker Street, Houston, Tex., is planning for the erection of a one-story addition to cost about \$20,000.

The Temple Lumber Co., Hemphill, Tex., has tentative plans for rebuilding the portion of its lumber mill and power plant destroyed by fire Feb. 15, with loss estimated at \$1,000,000. The loss included foundry and machine shop with equipment.

The R. B. George Machinery Co., Dallas, Tex., has leased a two-story building at Ross Avenue and Austin Street, 100 x 200 ft., for a local works and headquarters.

The St. Louis & Southwestern Railroad Co., St. Louis, is planning the construction of an oil storage and distributing plant at Waco, Tex., with capacity of 550,000 gal., estimated to cost \$85,000, including equipment. W. S. Hanley, Tyler, Tex., is chief engineer.

R. E. Boggs, 1315 Jefferson County Bank Building, Birmingham, machinery dealer, is in the market for a jaw crusher, about 12 x 24 in., with or without screen and elevator; also for one steam shovel, Marion model 61, or equal.

Traveling cranes and other equipment, with high density compress plant, will be installed at the warehouses to be erected on the Ship Channel by Anderson, Clayton & Co., Houston, Tex., cotton merchants. The initial plant will cost about \$1,000,000.

The Calcasieu Mfg. Co., Elizabeth, La., has construction in progress on a new paper mill to cost \$100,000 and will install machinery at an early date.

The Board of Aldermen, Oxford, Miss., will take bids until March 15 for a generator, engine and switchboard for installation in the municipal electric light and water plant. T. M. Early is in charge.

The Sun Oil Co., Miami, Fla., has plans for a new oil storage and distributing plant at Third Street and Alton Road, to cost \$75,000 with equipment.

The Municipal Waterworks, Light & Power Plant Board, De Quincy, La., W. W. Tuck, president, will receive bids until March 6 for light and power equipment for a municipal plant, including 50 and 100 kw. generators, oil engines, switchboard, motor-driven pumps, transformers, etc. J. W. Billingsley, 711 Interstate Building, New Orleans, is engineer.

The Chevrolet Motor Co., Fort Worth, Tex., southwestern branch, has awarded contract to the Hughes-O'Rourke Construction Co., Dallas, Tex., for a new four-story, concrete plant, 100 x 150 ft., at Commerce Street and College Avenue,

East Dallas, estimated to cost \$125,000. It will be equipped for parts production, repair work, etc.

The Cassady-Grey Granite Co., Llano, Tex., will install a cableway system with capacity of 15 tons at its granite properties. Other improvements will be made and additional equipment installed.

The Southern Paper Co., Moss Point, Miss., has awarded a general contract to George J. Glover, Whitney Central Building, New Orleans, for an addition, one to five stories, 75 x 800 ft., estimated to cost \$1,500,000, including machinery. A power plant will also be erected. George F. Hardy, 309 Broadway, New York, is engineer.

A manual training department will be installed in the new high school to be erected at Palmetto, Fla., by the Manatee County Board of Education, Bradenton, Fla., estimated to cost \$100,000. Johnson & Fonda, Bradenton, are architects.

A manual training department will be installed in the new high school to be erected at Napoleonville, La., estimated to cost \$75,000, for which bids will be received on a general contract March 6. William T. Nolan, Canal Commerce Building, New Orleans, is architect.

The Texas Power Co., Cuero, Tex., will install electric power machinery to cost about \$100,000 at its hydroelectric generating plant.

Forsythe & White, Birmingham, have plans for a new hardwood mill estimated to cost \$60,000, including machinery. Other units to cost approximately a like amount will be built later.

Electrically-operated pumping machinery will be installed at the proposed new waterworks plant to be erected by the Common Council, Howe, Tex., estimated to cost \$60,000.

A manual training department will be installed in the new junior high school to be erected at Laredo, Tex., for which a bond issue of \$75,000 is being arranged. The Board of Education is in charge.

The Arkansas Light & Power Co., Eldorado, Tex., has plans nearing completion for a one-story ice manufacturing and refrigerating plant, with initial daily capacity of 85 tons, estimated to cost \$100,000 with machinery.

The Agricola Pipe Co., Gadsden, Ala., has been organized with a capital of \$250,000 to take over the plant and business of the Campbell Co., North Third Street. Extensions and improvements will be made, and the entire works given over to cast iron pipe manufacture. Otto Agricola is president, and Fred T. Agricola, secretary and treasurer.

The Central South

ST. LOUIS, Feb. 26.

A TWO-STORY plant, 100 x 100 ft., estimated to cost \$50,000 with equipment, will be erected by John Moore, 201 North Norton Street, Okmulgee, Okla., for the manufacture of automobile equipment and accessories. Smith & Senter, 401 Commerce Building, are architects.

The Williamson Construction Co., Pikeville, Tenn., is making inquiries for stationary steam engines and auxiliary equipment for a power house at its properties.

The Caddo River Power & Irrigation Co., Little Rock, Ark., will construct and operate a hydroelectric power plant on the Caddo River, near Hot Springs, Ark. The initial plant will have a capacity of 15,000 hp., and is estimated to cost \$2,000,000. Other units will more than double this investment and represent an investment close to \$5,000,000. The company is a subsidiary of the Arkansas Light & Power Co., Arkadelphia, Ark. H. C. Couch is secretary.

The Dixie Brick & Tile Co., Puryear, Tenn., has completed plans for extensions, with the installation of additional machinery to provide for an output of about 35,000 face brick and fire brick per day. A clay grinding plant will also be equipped. O. A. Harker, Jr., is president.

A power house will be installed by the Sand Springs Cotton Mill Corporation, Sand Springs, Okla., in connection with a new textile mill to cost approximately \$120,000. The Southwest Engineering Co., 910 North Elwood Street, Tulsa, Okla., is engineer. Charles Page heads the company.

A manual training department will be installed in the new high school to be erected at Great Bend, Kan., for which an appropriation of \$250,000 has been arranged. Payson & Carswell, Interstate Building, Kansas City, Mo., are architects.

The City Council, Louisville, has made application for permission to construct and operate two municipal hydroelectric power plants on the Green River, near Mammoth Cave, and on the Cumberland River, near Burnside, respectively. Plans are being drawn.

An ice and refrigerating plant, with cold storage department, will be installed in the new five-story and basement

meat-packing plant to be erected by the St. Louis Independent Packing Co., St. Louis, at 3857 Chouteau Street, 150 x 250 ft., estimated to cost \$250,000. Gustave Bischoff heads the company.

The Pocahontas & Sewanee Coal and Iron Co., Pikeville, Ky., will install an electric power plant at its properties, with complete mining equipment for an output of about 2000 tons daily. Most of the machinery will be electrically operated. The Williamson Construction Co., Pikeville, will be in charge of the installation. K. P. Walker is secretary.

A manual training department will be installed in the proposed high school to be erected at Junction City, Kan., estimated to cost \$250,000. H. E. Chandler, Board of Education, is in charge.

The Cupples Station Light, Heat & Power Co., Cupples Station, St. Louis, a subsidiary of the Light & Development Co., St. Louis, is considering tentative plans for a new generating plant with initial capacity of about 100,000 kw., estimated to cost \$5,000,000.

The Spillers Specialty Mfg. Co., Eighth Avenue and Commerce Street, Nashville, Tenn., is in the market for an automatic lathe.

A manual training department will be installed in the two-story high school to be erected at Lenora, Kan., 100 x 130 ft., to cost (about) \$85,000. Smith & English, Nelson Building, Hutchinson, Kan., are architects.

The Oklahoma General Power Co., Muskogee, Okla., has plans for the erection of an addition to its new steam-operated electric power plant now being erected near Muskogee, with capacity of 10,000 hp. The additional unit will be equipped for an output of 20,000 hp. An appropriation of \$1,000,000 is being arranged for the work. The company is operated by the Bylesby Engineering & Management Corporation, 208 South La Salle Street, Chicago.

The Carr-Trombley Mfg. Co., Main and Branch Streets, St. Louis, manufacturer of furniture, has awarded contract to Murch Brothers, Railway Exchange Building, for a three-story and basement plant, 130 x 330 ft., on First Street, estimated to cost \$100,000, including machinery. A. B. Groves, 314 North Fourth Street, is architect.

Canada

TORONTO, Feb. 26.

IMPROVEMENT continues in the machine-tool market. A strong demand for a wide variety of tools is appearing and while the majority of orders has been for single tools or units of two or three, the volume closed has been satisfactory. The Canadian National Railways have been buying equipment for shops at St. Malo, Que.; Moncton, N. B., and Leaside, Ont., and have again entered the market with a large list. The tools are almost exclusively for replacement and extensions to shops from Port Arthur, Ont., West. In addition to the railroad business, industrial concerns are furnishing a good demand for machines.

The list of the Canadian National Railways follows:

Three standard 24-in. shapers.
One variety rip and cross cut saw.
One hand saw with 36 x 2-in. wheel.
One 24 or 30-in. single surface planer.
Two C.P. angle wood boring machines with hardened steel gears.
One Berwick three-two rivet-heating electric furnace, for 550 volts, 60 cycles, a.c. circuit or equal.

One V notch independent meter complete with clock recorder for circular graphic chart, of capacity for plant of 3600 boiler hp., complete with fans, charts, etc.

One C.G.E. Sprague 1-ton electric hoist, with hook suspension, 550 volts, three-phase, 60 cycle, to operate with drop ropes from floor.

Three C.P. angle wood boring machines with hardened steel gears and bushings.

One pneumatic portable hoist, with geared trolley to suit 8-in. I-beam.

One oyster pipe threading machine, capacity from $\frac{1}{2}$ in. to 4 in.; revolving head, motor driven, Westinghouse motor, 550 volts, three-phase, 60 cycle, 900 r.p.m. or equal.

One 20-in. engine lathe, belt driven, double back geared, quick change gear; taper attachment, approximately 6 ft. between centers.

One 16-in. sensitive upright drill, adjustable head and round adjustable table, belt driven.

One 24-in. face miller grinder, belt driven, to grind large milling cutters, etc.

One 24-in. upright drill, belt driven, round adjustable table, movable head, power and hand feed, back gear, to take drill up to 1 $\frac{1}{4}$ -in.

One 18-in. sensitive drill, belt driven, adjustable head and round adjustable table.

One high speed power hack saw, belt driven, to take material up to 12-in. round.

One centering machine, belt driven, single spindle, capacity 3-in. bar.

One turret lathe, 6-in. hollow spindle, motor driven, to machine piston rods 72 in. long, rough forgings.

One 18-in. engine lathe, 4 ft. between centers, with four-jaw chuck belt driven.

One 36-in. drill press.

One 2-in. turret lathe, 2 x 26, for special bolt and stud work for locomotive.

One standard guide bar grinder.

One 24-in. upright drill, belt driven.

One straightening press.

One set attachments Warner & Swasey turret lathe.

One 20-in. lathe with chuck, 6 ft. between centers, belt driven.

One standard 24-in. shaper, belt driven.

One 36-in. vertical Bertram or equal upright drill, belt driven.

One 24-in. vertical drill, belt driven.

One No. 10 metal cutting saw, capacity 8 in.

One 20-in. lathe with four-jaw chuck 4 ft. 6 in. between centers.

One 16-in. lathe with four-jaw chuck, 4 ft. between centers.

One 20-in. vertical drill.

One combined punch and shear, capacity 6 x $\frac{1}{2}$ -in.

One 20-in. lathe with four-jaw chuck, 16 ft. between centers.

One heavy duty planer, 12 ft. x 4 in.

One Lewis flue cutter, to cut flues $1\frac{1}{2}$ to 6 in.

One combination jolt and squeezer machine with draw attachment.

One sand blast, for cleaning large castings.

One Simpson bucket leader for mixer No. 2.

One special rail handling electric magnet.

One Perfecto serpentine shear No. 18, hand power.

One combined lever punch and slitting shears, No. 73 Brown Boggs Co., or equal.

One Canadian Ingersoll-Rand or equal air compressor.

One No. 59 stock and dies, $\frac{1}{4}$ to $1\frac{1}{2}$ -in.

One set maps, $\frac{1}{4}$ to $1\frac{1}{4}$ -in.; $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ —13 threads; $\frac{3}{8}$, $\frac{1}{4}$, $\frac{5}{16}$, 1, $1\frac{1}{2}$, $1\frac{1}{4}$ U. S. standard.

One triple pressure spring beading press.

One 34-in. standard shaping machine.

One Dexter globe valve reseating outfit from $\frac{1}{4}$ to 4-in. without stand equipment.

One 6-in. plain Reed vise No. 5931-104, catalog No. 20.

One No. 59 set U. S. standard stock and die.

One set each taps, $\frac{1}{4}$ -in., $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ —13 threads $\frac{3}{8}$, $\frac{1}{4}$, $\frac{5}{16}$, 1, $1\frac{1}{2}$, $1\frac{1}{4}$ -in., Butterfield & Co.

One 18-in. engine lathe with four-jaw chuck, 4 ft. between centers.

One Ashton wheel press recording gage ram 9-in. right hand.

Ten Ellison combination differential draft gages. Draft range 0 to $1\frac{1}{2}$, length 15 in., machine screws to be supplied.

Two Chicago chucks.

Sixteen Armstrong tools.

Two C.P. angle wood boring machines with hardened steel gears and flat in chuck.

One Herbert Morris or equal 1-ton electric hoist without trolley and arranged for hook suspension.

C. J. V. Spratt, Rockland Avenue, Victoria, B. C., will start work at once on the erection of a sawmill, shingle mill and wharf at Port Alberni, B. C., to cost \$250,000.

J. B. Mackenzie, Georgetown, Ont., is in the market for a surface planer, revolving bed preferred.

The Toronto Transportation Commission, Toronto, will equip a brass foundry in connection with new car shops to be erected at the corner of Davenport Road and Bathurst Street. Specifications have not yet been issued.

Bids will be received by R. C. Desrochers, secretary, Department of Public Works, Ottawa, until March 15, for machinery and equipment for the drydock at Esquimalt, B. C.

The Thurston-Flavelle Sawmills, Port Moody, B. C., is installing additional equipment.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of *THE IRON AGE* under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.19c.
Swedish bars, base price	7.50c.
Soft steel bars, base price	3.19c.
Hoops, base price	5.04c.
Bands, base price	3.99c.
Beams and channels, angles and tees 3 in. x 1/4 in. and larger, base	3.29c.
Channels, angles and tees under 3 in. x 1/4 in., base	3.19c.

Merchant Steel

Per Lb.

Tire, 1 1/2 x 1/2 in. and larger	3.20c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger)	3.40c.
Toe-calk, 1/2 x 3/8 in. and larger	4.15c.
Cold-rolled strip, soft and quarter hard	6.75c. to 7.75c.
Open-hearth spring steel	4.00c. to 6.00c.
Shafting and Screw Stock:	
Rounds	4.05c.
Squares, flats and hex	4.55c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High speed steel, 18 per cent tungsten	75c. to 80c.

Tank Plates—Steel

1/4 in. and heavier	3.29c.
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Sheets

Blue Annealed

Per Lb.

No. 10	4.19c.
No. 12	4.24c.
No. 14	4.29c.
No. 16	4.39c.

Box Annealed—Black

Soft Steel C. R., One Pass. Per Lb.	Blued Stove Pipe Sheet Per Lb.
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Nos. 18 to 20	4.15c. to 4.55c.
Nos. 22 and 24	4.20c. to 4.60c.	4.60c.
No. 26	4.25c. to 4.65c.	4.65c.
No. 28	4.35c. to 4.75c.	4.75c.
No. 30	4.60c. to 5.00c.	....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

Per Lb.

No. 14	4.45c. to 4.85c.	....
No. 16	4.60c. to 5.00c.	....
Nos. 18 and 20	4.75c. to 5.15c.	....
Nos. 22 and 24	4.90c. to 5.30c.	....
No. 26	5.05c. to 5.45c.	....
No. 27	5.20c. to 5.60c.	....
No. 28	5.35c. to 5.75c.	....
No. 30	5.85c. to 6.25c.	....

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

Black Galv.

1/4 in. Butt...	—47	—31	1/2 in. Butt...	—4	+19
5/8 in. Butt...	—52	—39	5/8 in. Butt...	—11	+9
1-3 in. Butt...	—54	—41	1-1/2 in. Butt	—14	+6
2 1/2-6 in. Lap...	—50	—37	2 in. Lap...	—5	+14
7-8 in. Lap...	—47	—20	2 1/2-6 in. Lap...	—9	+9
9-12 in. Lap...	—42	—18	7-12 in. Lap...	—3	+16

Wrought Iron

Black Galv.

Bright basic	4.75c. to 5.00c.
Annealed soft	4.75c. to 5.00c.
Galvanized annealed	5.40c. to 5.65c.
Coppered basic	5.40c. to 5.65c.
Tinned soft Bessemer	6.40c. to 6.65c.

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER		Per Lb.
Bright basic	4.75c. to 5.00c.	
Annealed soft	4.75c. to 5.00c.	
Galvanized annealed	5.40c. to 5.65c.	
Coppered basic	5.40c. to 5.65c.	
Tinned soft Bessemer	6.40c. to 6.65c.	

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	21 1/4c. to 22 1/8c.
High brass wire	21 1/4c. to 22 1/8c.
Brass rods	18 1/4c. to 19 1/8c.
Brass tube, brazed	28 1/4c. to 29 1/8c.
Brass tube, seamless	24 1/4c. to 24 1/8c.
Copper tube, seamless	27 1/4c. to 27 1/8c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 23 7/8c. to 24 1/8c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Coke—14-20

Grade "AAA"	Grade "A"	Prime	Wasters
Charcoal 14x20	Charcoal 14x20	80 lb. \$5.80	\$5.55
		90 lb. 5.90	5.65
		100 lb. 6.00	5.75
IC.. \$10.00	\$8.50	IC.. 6.15	5.90
IX.. 11.50	10.00	IX.. 7.15	6.90
IXX.. 13.00	11.25	IXX.. 8.15	7.90
IXXX.. 14.25	12.50	IXXX.. 9.15	8.90
IXXXX.. 16.00	14.00	IXXXX.. 10.15	9.90

Terne Plates

8-lb. coating, 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits pig	47c.
Bar	55c. to 60c.

Copper

Lake ingot	18 c.
Electrolytic	17 1/2c.
Casting	17 1/4c.

Spelter and Sheet Zinc

Western spelter	8 1/4c.
Sheet zinc, No. 9 base, casks	10 1/4c. open 10 1/2c.

Lead and Solder*

American pig lead	9c. to 9 1/4c.
Bar lead	12c. to 14c.
Solder, 1/2 and 1/4 guaranteed	30 1/2c.
No. 1 solder	29c.
Refined solder	26c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	8 1/2c. to 9 1/4c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	27c. to 28c.
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Old Metals

	Cents Per Lb.
Copper, heavy crucible	13.75
Copper, heavy wire	13.00
Copper, light and bottoms	11.25
Brass, heavy	7.75
Brass, light	6.75
Heavy machine composition	10.50
No. 1 yellow brass turnings	7.75
No. 1 red brass or composition turnings	9.00
Lead, heavy	7.00
Lead, tea	5.25
Zinc	4.50

